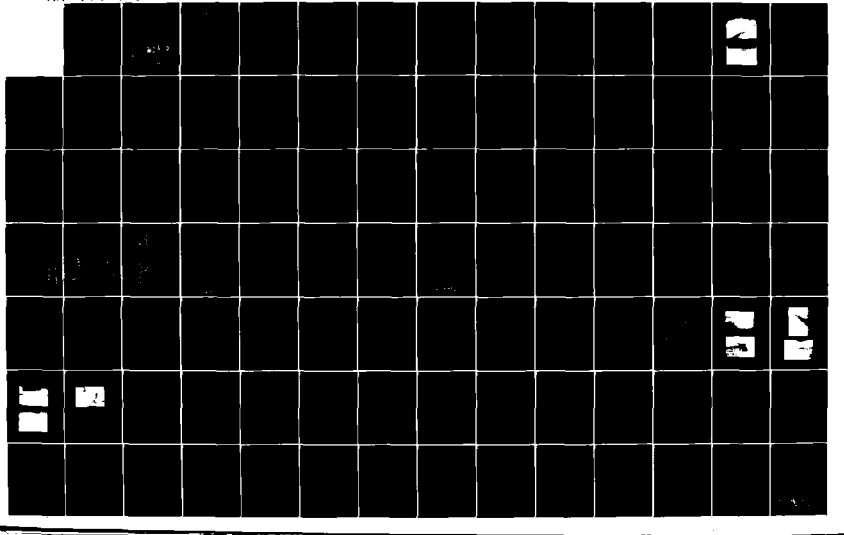
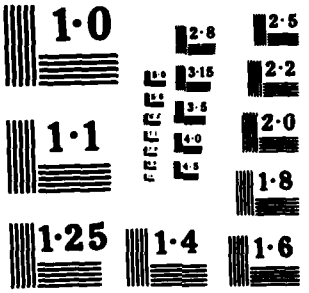
AD A156 749 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS SLATERSVILLE RESERVOI..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV JUL 79 1/1

UNCLASSIFIED F/G 13/13 NL




1·0
1·1
1·25
1·4
1·6
1·8
2·0
2·2
2·5
2·8
3·15
3·5
4·0

BLACKSTONE RIVER BASIN
NO. SMITHFIELD, RHODE ISLAND

SLATERSVILLE RESERVOIR MIDDLE DAM

RI 02502

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JULY 1979

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER RI 02502	2. GOVT ACCESSION NO. AD A156 749
	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Slatersville Reservoir Middle Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254	12. REPORT DATE July 1979
	13. NUMBER OF PAGES 41
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Blackstone River Basin
No. Smithfield, Rhode Island
Branch River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THe dam is a composite masonry and earth dam. The entire length of the dam is 310 ft. The range for the test flood is ½ PMF to PMF. The dam is judged to be in generally fair condition owing to the absence of dewatering facilities. It is intermediate in size with a significant hazard potential. There are recommendations and remedial measures which should be undertaken by the owner.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

SLATERSVILLE RESERVOIR MIDDLE DAM

RI 02502

BLACKSTONE RIVER BASIN
NORTH SMITHFIELD, RHODE ISLAND

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	RI 02502
Name of Dam:	Slatersville Reservoir Middle Dam
Town:	North Smithfield
County and State	Providence County, Rhode Island
Stream:	Branch River
Date of Inspection:	23 April and 10 May 1979

BRIEF ASSESSMENT

Slatersville Reservoir Middle Dam is a composite masonry and earth dam consisting of a 150 ft. downstream ashlar-faced masonry overflow section, an ashlar-faced masonry, earth filled right abutment about 40 ft. long and an ashlar-faced masonry, earth filled left abutment about 120 ft. long. The entire length of the dam is about 310 ft. It is a run-of-the-river dam and is the mid-dam of three dams forming the Slatersville Reservoirs, which once furnished the water needs for a mill located downstream but no longer serve that purpose.

The pond behind the dam is about 4,800 ft. long and has a surface area at spillway level of about 74 acres. The drainage area above the dam is 88.5 sq mi. and the maximum storage to the top of dam is estimated at about 1,330 acre-ft. The height of the dam is about 26 ft.; the size classification is governed by storage and is thus intermediate. A breach of the dam would affect part of an industrial complex, three homes, a restaurant and two local roads. The dam has been classified as having a significant hazard potential. Based on intermediate size and significant hazard, the range for the test flood is ½ PMF to PMF. The selected test flood for this project is ½ PMF.

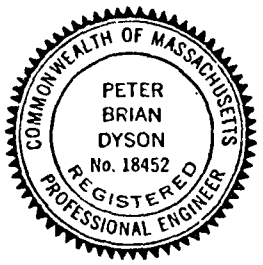
The dam is judged to be in generally fair condition owing to the absence of dewatering facilities. Water was flowing to a depth of about 2 in. over the crest of the spillway at the time of the inspection, so it was not possible to observe the condition of the downstream ashlar face. Nevertheless, the water appeared to be flowing uniformily along the downstream face with no evidence of turbulence, or missing or eroded elements. A few trees are growing on the right abutment.

The test flood inflow equals 19,000cfs. The routed test flood outflow (18,700cfs) overtops the non-overflow section. The test flood would overtop the abutments by about 4.35 ft. The spillway can pass 5,670 cfs or about 30 percent of the routed test flood outflow without overtopping the abutments.

Within one year after receipt of this Phase I Inspection Report, the owner, The Dudley Development Corp., should retain the services of a registered professional engineer and implement the results of his evaluation of the following: (1) assess further the potential for overtopping and the adequacy of the spillway; (2) study the feasibility of providing a means to safely drain the ponded water above the dam; and, (3) inspect the spillway during periods of low or no flow conditions.

The owner should also implement the following operating and maintenance measures: (1) clear trees and brush from the right abutment; (2) develop a formal surveillance and flood warning plan; and, (3) institute procedures for an annual periodic technical inspection of the dam.

Peter B. Dyson
Project Manager



PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

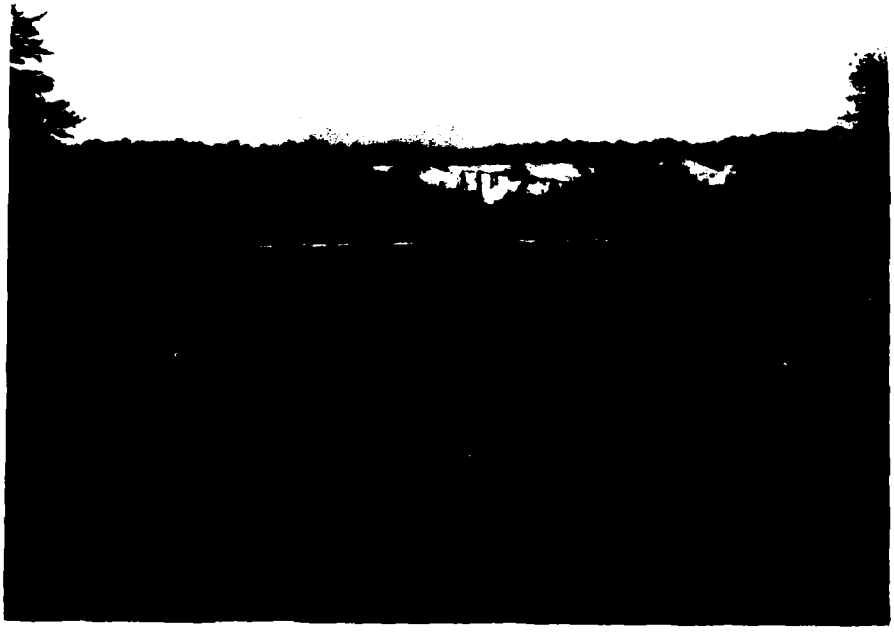
It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

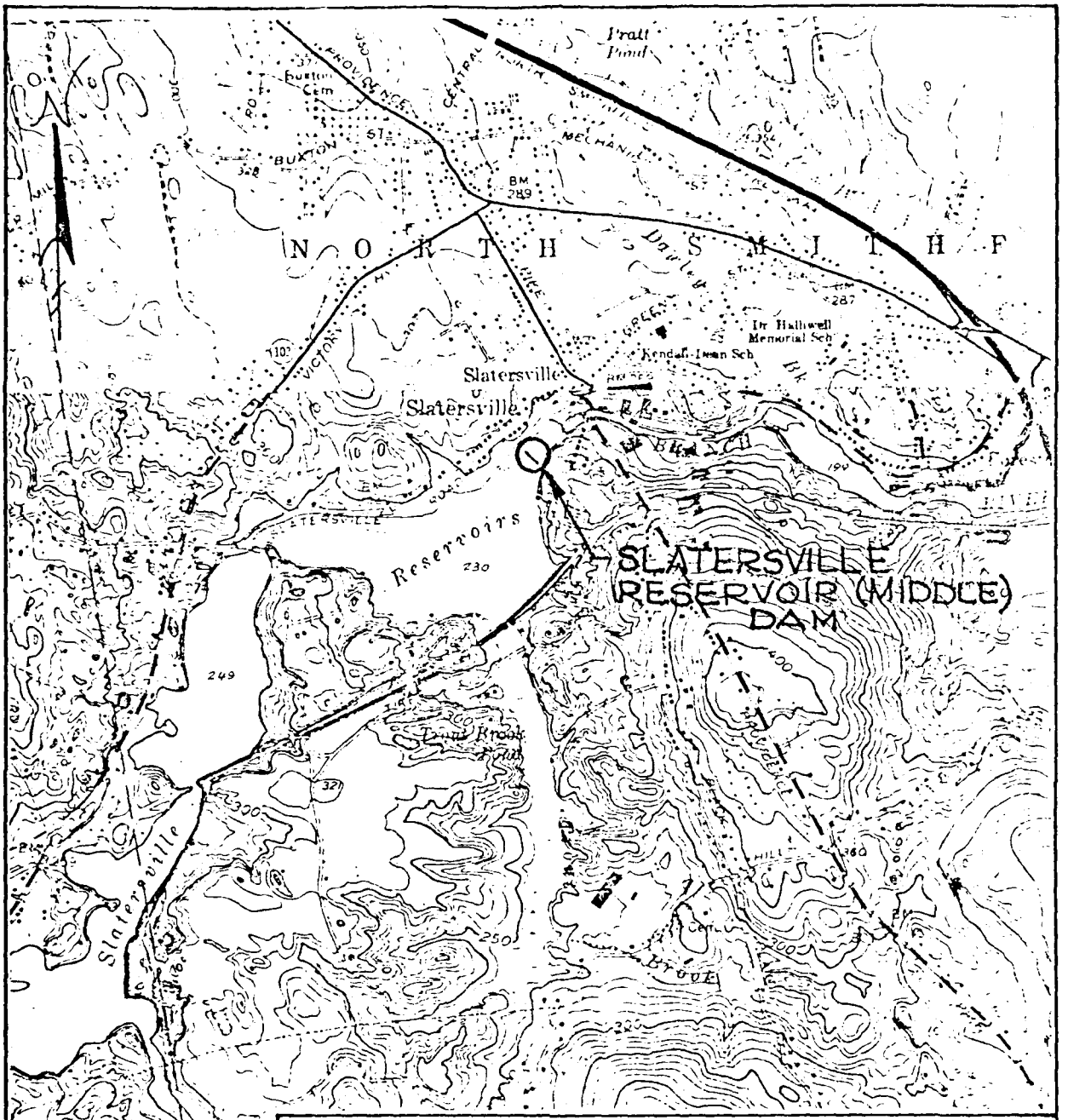
TABLE OF CONTENTS

SLATERSVILLE RESERVOIR MIDDLE DAM

Overview from Right Abutment



Overview from Lower Dam



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT - ENGINEER	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SLATERSVILLE RESERVOIR MIDDLE

GEORGIAVILLE QUADRANGLE

BLACKSTONE RIVER BASIN STATE - R.I.

			SCALE 1:24000
			DATE

SECTION 7
ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. On the basis of the Phase I visual examination, Slatersville Reservoir Middle Dam appears to be in fair condition, owing to the absence of dewatering facilities. The deficiencies revealed indicate that a further investigation should be carried out and that some remedial work is needed. The major concerns with the overall integrity of the dam are as follows:

1. The spillway will only pass about 30 percent of the routed test flood outflow.

2. The lack of facilities for drawing down the reservoir.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. The recommendations and remedial measures enumerated below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Investigations. Additional investigations are required as recommended in Para. 7.2.

7.2 Recommendations

It is recommended that the owner, Dudley Development Corp., should retain the services of a competent registered professional engineer to make further investigations of the following, and should implement the results:

(1) Make a thorough study of the hydrology of the drainage basin and evaluate further the potential for overtopping and the inadequacy of the spillway.

(2) Study the feasibility of providing a means to safely drain the reservoir.

(3) Inspect the spillway during period of low or no flow conditions.

7.3 Remedial Measures

a. Operating and Maintenance Procedures.

(1) Remove tree and brush growth from the right abutment.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. There are no design calculations available for review of the structural stability of the dam and appurtenant structures. However, the investigations and findings described herein do not indicate any displacement or distress which would warrant the preparation of structural stability calculations based on assumed soil properties and engineering factors. The dam is now stable, but deficiencies described under Section 7 should be corrected.

b. Design and Construction of Dam. No plans or calculations of value to a stability assessment are available for the dam.

c. Operating Records. There are no records which indicate the manner in which the dam has been operated.

d. Post-Construction Changes. There are no known records of any post-construction changes, although there is some verbal authority, at least, for a 1956 reconstruction. From inspection of the dam, however, it is unlikely that this reconstruction, of whatever scope, could have affected adversely the stability of the dam.

e. Seismic Stability. The dam is located in Seismic Zone No. 1 and in accordance with Phase I guidelines does not warrant seismic analyses.

Results of Dam Failure

River Section	Reservoir @ Elev. 237.85 Before Breach of Structure: Discharge cfs	Reservoir @ Elev. 237.85 Before Breach of Structure: River Stage Ft.	Reservoir @ Elev. 237.85 After Breach of Main Overflow Section: Discharge cfs	Reservoir @ Elev. 237.85 After Breach of Main Overflow Section: River Stage Ft.
16+00	5,670	7.4	14,610	12.6
*46+00	5,670	6.0	13,120	8.0
69+00	5,670	7.4	12,477	10.5
91+00	5,670	8.3	10,955	10.3
**146+00	5,670	8.8	9,936	11.7

*Estimated Stage Above Crest of Dam at Old Mill Pond
**Confluence with Blackstone River

In summary, about two industrial buildings, three homes, a restaurant, and two roadways are within the area of potential flooding (see Appendix D, Figure 3, Sheet D-21).

Flood Magnitude	Max. Routed Outflow cfs	Max. Res. El. ft. MSL	Max. Head Over Dam ft.	Max. Disch. Over Dam cfs
½ PMF (Test Flood)	19,000	242.20	4.35	18,700
PMF	38,000	246.05	8.2	37,200

From the above table, it can be seen that the project will not pass the routed test flood outflow without overtopping the dam by 4.35 ft. The project, however, can handle 30 percent of the routed test flood outflow without overtopping the dam. The spillway capacity at the top of dam is 5,670 cfs.

f. Dam Failure Analysis. As discussed above, the dam would be overtopped by the routed test flood outflow. Also a breach owing to structural failure of the dam by piping is a possibility. For this analysis a breach was assumed with the water level at the top of dam. The "rule of thumb" criteria suggested in the NED March 1978 Guidance Report was used. With a breach width of 40 percent of the dam length, or about 60 ft., an outflow of about 16,870 cfs, which includes 3,500 cfs from the intact portion of the spillway, would be realized (see Sheets D-11 thru D-20, Appendix D). It was also assumed that Slatersville Lower Reservoir Dam located about 600 ft. downstream of the middle dam would be washed out.

In reaches below the dam the outflow first passes under the Providence Turnpike through a masonry, twin-arch bridge. Beyond the bridge a mill is located high on the left bank and an industrial complex occupies the right bank at a lower elevation. The flow is then confined to a narrow ravine as it threads its way to another mill dam and pond. This lower dam is located about 1.10 miles below Slatersville Reservoir Middle Dam. Below this dam the river is again confined to a steep ravine until it reaches the vicinity of the Smithfield Expressway and the Louisquisset Pike. In this area the river valley widens but no structures exist in the valley. Beyond the Louisquisset Pike the river narrows and is confined until it reaches its confluence with the Blackstone River at a point about 2.76 miles below the Slatersville Reservoir Middle Dam.

The most significant area to be impacted as a result of a breach of the dam would be the area extending immediately downstream of the dam for a distance of about one-half mile. The Providence Pike and a few industrial buildings located within this reach would sustain significant damage if a breach should occur. The only other structures that would sustain damage are three houses and a restaurant which are north of the river and are located about 3,800 ft. downstream of the Slatersville Reservoir Middle Dam. At this location the river stage would increase in depth on the order of 2 ft. to 5 ft. River valley routing downstream would produce discharges as shown in the following table. Also shown is the river stage just prior to failure.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. The Slatersville Reservoir Middle Dam is a run-of-the-river type project, originally constructed to furnish the water needs of a mill located downstream. It is the mid-dam of three dams which retain a series of ponds forming the reservoir system. It is basically a low storage-high spillage dam. It consists of an ashlar masonry overflow dam and two ashlar faced earth-fill abutments.

b. Design Data. No hydrologic or hydraulic design data was retrieved for Slatersville Reservoir Middle Dam.

c. Experience Data. No records are available in regard to past operation of the dam. There is one plan available which shows a high water mark recorded at the dam during the November 4, 1927 flood. The plan indicates that the water was 5 ft. above the crest of the dam on that date, which would correspond to a discharge of about 5,300 cfs. U.S.G.S. Gauging Station 01111500 at Forestdale, R.I. is located about 1.17 miles downstream of the dam. According to U.S.G.S. Water Supply Papers, the maximum discharge at the site since 1886 was about 5,800 cfs occurring on March 19, 1936, by computation of flow over a dam located 1 mile upstream of the gauge. The highest discharge recorded at the gauge itself was 5,470 cfs occurring on January 25, 1979. The drainage area for the Gauge is 91.2 sq. mi. compared with a drainage area above Slatersville Reservoir Middle Dam of 88.5 sq. mi.

d. Visual Observations. No evidence which would indicate possible high flows through the reservoir area or in the downstream channel were noted.

e. Test Flood Analysis. Slatersville Reservoir Middle Dam is about 26 ft. high and impounds about 1,330 acre-ft. to the top of dam; therefore, it is classified as intermediate in size. Because of downstream conditions, the hazard potential is classified as significant. In accordance with Recommended Guidelines for Safety Inspection of Dams, the recommended test flood is one half the probable maximum flood to a full maximum flood (PMF). A test flood of a magnitude corresponding to ½ PMF was selected for the evaluation.

The NED March 1978 Preliminary Guidance Memorandum for Estimating Probable Discharges was used for estimating the maximum probable flood peak flow rate, which was then divided by two to arrive at the test flood value. The test flood inflow for Slatersville Reservoir Middle Dam, having a drainage area of 88.5 sq. mi., was determined to be about 215 CSM or about 19,000 cfs. Flood routings through the reservoir were performed for both the ½ and the full PMF in the analysis. Results of these routings are shown on Sheets D-8, D-9, and D-10, and are summarized as follows:

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The Dudley Development Corp. is the owner and operator of the dam. There are neither operating devices at the dam nor any documented operating procedures for the dam.

4.2 Maintenance of Dam

There is no specific maintenance program in effect at Slatersville Reservoir Middle Dam.

4.3 Maintenance of Operating Facilities

The original gates in the filled-in canal have been removed. There are now no operating facilities for the dam.

4.4 Warning System

No warning system is in effect at Slatersville Reservoir Middle Dam.

4.5 Evaluation

The dam serves no useful purpose at the present, though the owner has shown interest recently in installing a small hydroelectric facility. Maintenance involves periodic growth removal from the abutments, surveillance regarding seeps, repair of ashlar masonry and keeping the spillway crest clear of debris. The owner should establish a formal warning system for the dam in the event of an emergency.

d. Reservoir Area. The reservoir behind the dam is a ponding of the Branch River. The upper reaches of the ponded area extend to the tailwaters of the Slaterville Reservoir Upper Dam. The reservoir area offers frequent evidence of rock outcrops, generally foliated gneisses. The slopes are partly wooded and are stable.

e. Downstream Channel. Immediately donwstream of the dam, another ponding of the Branch River is formed by the Slatersville Reservoir Lower Dam. The lower dam is located about 600 ft. downstream of the Middle Dam. The river beyond the Lower Dam is contained in a generally deep valley with little valley storage available. About 400 ft. downstream of the Lower Dam a masonry, twin-arch bridge carries the Providence Pike roadway over the river. Just beyond the bridge, a historic mill complex is located high on the left bank and an industrial development is located at lower elevations on the right bank. From this point the river follows a steep ravine until it empties into a mill pond about 2,500 ft. below the Providence Pike. Here the river channel widens until it reaches another dam. Beyond this dam the valley is narrow to its confluence with the Blackstone River, about 2.76 miles below the Slatersville Reservoir Middle Dam (see Photo Nos. 6 and 7, Appendix C).

3.2 Evaluation

In general the visual inspection of the dam adequately revealed key characteristics of the project as they may relate to its stability and integrity, permitting an assessment to be made of those features affecting the safety of the structure. The only exception to the above was that, due to the flow over the crest of dam, it was not possible to observe the condition of the ashlar face of the spillway at the time of the inspection. However, the water appeared to be flowing uniformly with no evidence of turbulence or missing or eroded elements. There was no sign of seepage in the abutments, nor signs of animal burrows. There was a small amount of growth on the right abutment. The Slatersville Reservoir Middle Dam was judged to be in fair condition owing to the absence of dewatering facilities.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General. The visual inspection of Slatersville Reservoir Middle Dam took place on 23 April and 10 May 1979. On 23 April the water was about 2 inches above the spillway crest. The discharge over the spillway was estimated to be about 25 cfs. There was no evidence of any major maintenance problems, but one item requires attention (See Section 7.3). The dam was judged to be in fair condition owing to the absence of dewatering facilities.

b. Dam. The dam is a run-of-the-river dam with an overall length of 310 ft. It is the mid-dam of three dams which retain a series of ponds making up the Slatersville Reservoir Complex. The reservoirs were formerly used for processing water in the mill community of Slatersville. All three dams are of the same general construction. The middle dam has a 150 ft. long, gently arched upstream spillway, between two earthfilled ashlar faced abutments. The northerly or left abutment is about 120 ft. long and the south, right abutment is about 40 ft. long. The left abutment contains a filled-in canal that once connected the entire reservoir system to the mill complex downstream. The ashlar facing of the spillway and of the abutments was judged to be in excellent condition. Although there was evidence of trespass on the approach slopes to the right abutment, the abutment was nevertheless in very good condition. A resident in the neighborhood informed the inspection party that the dam had been repaired in 1956, at which time the impoundment had been drawndown. It is unknown how the reservoir was drawndown.

c. Appurtenant Structures. The overflow portion or spillway of the dam is an ashlar faced masonry gravity structure with mortared joints. The downstream face has a slight batter, and it is estimated that the upstream slope is 2½ horizontal to 1 vertical. The top of the spillway is about 3 ft. wide with a capstone sill. The coping, or capstone, is a carefully shaped. 20 in. thick granite slab about 3 ft. wide, with provision for flashboards. A detail of a similar dam top indicates that the capstone or coping is set on the granite masonry with a rubble interface between the capstone and the gravel backfill. Sections on drawings of a similar dam indicate that the upstream side of the masonry spillway has been filled with granular material on a slope of 2½ horizontal to 1 vertical from coping to base. Water passing over the spillway appeared to be flowing uniformly with no evidence of turbulence or missing or eroded elements. Nevertheless, the downstream face should be inspected under low or no flow conditions (See Section 7.2).

There are no dewatering facilities at this dam. A sluiceway through the left abutment was plugged and abandoned prior to 1939. The gate mechanisms have been completely removed (see Photo Nos. 1-5, Appendix C).

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No design data of the nineteenth century dam or appurtenances has been recovered and probably none exists. One drawing has been located for the Slatersville Upper Dam which is dated 1886. The drawing is typical of all three Slatersville Dams and it is believed that all three dams were constructed at about the same time as part of one construction project.

2.2 Construction Data

No records or correspondence regarding construction have been found. The Rhode Island Department of Environmental Management, Division of Land Resources has made available a set of 5 drawings showing plan views of the dams in the Slatersville Reservoir Complex. These plans show the dams as they existed in 1941. Copies of these plans are included in Appendix B.

2.3 Operation Data

There are no operating devices at this dam.

2.4 Evaluation of Data

a. Availability. Since little engineering data is available, it is not possible to make an assessment of the safety of the dam. The basis of the information presented in this report is principally the visual observations of the inspection team.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgement.

c. Validity. Not applicable

(3) Height - 26 ft. ±

(4) Top width - Varies

(5) Side slopes - overflow section - Downstream slight batter
Upstream 2½ horizontal to 1 vertical

(6) Zoning - Unknown

(7) Impervious core - Unknown

(8) Cutoff - Unknown

(9) Grout curtain - Unknown

h. Diversion and Regulating Tunnel - Not applicable

i. Spillway

(1) Type - Overflow gravity dam

(2) Length of weir - 150 ft.

(3) Crest elevation - 232.6

(4) Gates - None

(5) Upstream channel - Natural river channel

(6) Downstream channel - Natural river channel

(7) General - Spillway flows directed into small reservoir

j. Regulating Outlets - None

(3) Upstream portal invert diversion tunnel - Not applicable

(4) Recreation pool - Not applicable

(5) Full flood control pool - Not applicable

(6) Ungated spillway crest - 232.6

(7) Design surcharge (original design) - Unknown

(8) Top of non-overflow abutment - 237.85

(9) Test flood design surcharge - 242.2

d. Reservoir

(1) Length of maximum pool - 4800 ft.

(2) Length of recreation pool - Not applicable

(3) Length of flood control pool - Not applicable

e. Storage (acre-ft.)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest pool El. 232.6 - 740

(4) Top of non-overflow abutment El. 237.85 - 1330

(5) Test Flood Pool El. 242.2 - 2050

f. Reservoir Surface (acres)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest El. 232.6 - 74

(4) Top of non-overflow abutment El. 237.85 - 140

(5) Test flood pool El. 242.2 - 205

g. Dam

(1) Type - Gravity overflow with downstream masonry section and upstream earth fill

(2) Length - 310 ft.

i. Normal Operating Procedure. There are no operational procedures for Slatersville Reservoir Middle Dam.

1.3 Pertinent Data

a. Drainage Area. The drainage area above Slatersville Reservoir Middle Dam consists of about 88.5 sq. mi., described in general as flat and coastal area. It is located in the northeast corner of Rhode Island and its northern reaches extend into the State of Massachusetts. In the upper reaches of the drainage area the topography is generally heavily wooded, rolling terrain. The lower reach area is more urbanized and tends to be flatter. The area contains numerous old power plants and reservoirs, the largest being Pascoag Reservoir located about 11 miles upstream of Slatersville Reservoir Middle Dam.

b. Discharge at Damsite.

(1) Outlet works conduit. None

(2) Maximum known flood at Damsite. The maximum discharge at the damsite is unknown. An old plan of the dam showing stages recorded in November, 1927 indicates that the stage at the damsite was about 5 ft. above the crest of the dam on November 4, 1927. A stage of 5 ft. would correspond to a discharge of about 5,300 cfs. U.S.G.S. Station 01111500, at Forestdale, R.I., having a drainage area of 91.2 sq. mi., is located about 1.17 miles downstream of the dam. According to U.S.G.S. Water Supply Papers the maximum discharge at the site since 1886 was about 5,800 cfs on March 19, 1936, by computation of flow over a dam located 1 mile upstream of the gage. The highest discharge recorded at the gage was 5,470 cfs on January 25, 1979.

(3) Ungated Spillway Capacity at Top of Dam. The total spillway capacity at top of abutments, elevation 237.85 is 5,670 cfs.

(4) Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity is about 13, 700 cfs at test flood elevation 242.2 MSL.

(5) Gated Spillway Capacity at Normal Pool Elevation. Not applicable

(6) Gated Spillway Capacity at Test Flood Elevation. Not applicable

(7) Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at the test flood elevation is the same as (4) above, 13,700 cfs at elevation 242.2 MSL.

(8) Total Project Discharge at Test Flood Elevation The total project discharge at test flood is 18,700 cfs at elevation 242.2 MSL.

c. Elevations (Ft. above MSL)

(1) Streambed at centerline of dam - 212.0

(2) Maximum tailwater - Unknown

is unknown. A cap-stone sill along t' spillway crest serves as a control. The total length of the dam is about 310 ft. There are no dewatering facilities for the reservoir.

c. Size Classification. Slatersville Reservoir Middle Dam has a hydraulic height of about 26 ft. above downstream river level, and impounds a normal storage of about 740 acre-ft. to spillway crest level and a maximum of about 1,330 acre-ft. to the top of dam. In accordance with size and capacity criteria given in Recommended Guidelines for Safety Inspection of Dams, capacity governs and the project falls into the intermediate category and therefore is classified accordingly.

d. Hazard Classification. The Branch River below Slatersville Reservoir Middle Dam flows through a rather narrow ravine before entering the Blackstone River about 2.76 mi. downstream of the dam. About 2,500 ft. downstream of the dam, the valley widens and an industrial complex is located on the right bank. It is estimated that the stage of the river in this reach, due to a breach of the dam, would be about 12.5 ft. high and cause severe flooding of a portion of the industrial complex. Beyond this point the valley is narrow until it reaches an old mill pond site. It is anticipated a local road, three houses and a restaurant would sustain damage in this area.

A sudden breach of the dam would probably cause the loss of a few lives and result in appreciable community and industrial economic losses. Consequently, Slatersville Reservoir Middle Dam has been classified as having a significant hazard potential, in accordance with the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership. Slatersville Reservoir Middle Dam is owned by the Dudley Development Corp., 58 Hamlet Avenue, Woonsocket, R.I. 02895.

State of Rhode Island records indicate that the dam was owned by The Kendall Company in 1946. The dam is believed to have been constructed around 1886 for John W. Slater for use in his textile milling operation.

f. Operator. Mr. Herbert Sturgis, General Manager, Holliston Sand Company, c/o Dudley Development Corp., 58 Hamlet Avenue, Woonsocket, R.I. 02895. Telephone: (401) 766-5010

g. Purpose of Dam. The dam was originally constructed to create industrial water storage for John W. Slater's milling operations. At the present time the reservoir is not utilized, except possibly for fishing and boating.

h. Design and Construction History. No information is available regarding design and construction of the dam. The dam is believed to have been constructed around 1886 by John W. Slater for use in his textile milling operations. J. W. Ellis, C.E., of Woonsocket, R.I. designed the Slaterville Reservoir Upper Dam and it is believed that he was designer of the Middle Dam also.

PHASE I INSPECTION REPORT

SLATERSVILLE RESERVOIR MIDDLE DAM RI 02502

SECTION 1 - PROJECT INFORMATION

1.1 General.

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Louis Berger & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Rhode Island. Authorization and notice to proceed was issued to Louis Berger & Associates, Inc. under a letter of 19 March 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0051 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project.

a. Location. The Slatersville Reservoirs and Dams are located on the Branch River near the community of Slatersville in the town of North Smithfield, Providence County, Rhode Island. The Slatersville Reservoir Middle Dam is one of three dams located along the river forming the reservoirs. The Slatersville Reservoir Middle Dam is located about 2.76 miles upstream from the Branch River's confluence with the Blackstone River. The dam site is shown on U.S.G.S., Quadrangle, Georgiaville, Rhode Island, with coordinates approximately at N 41° 59' 51", W 71° 34' 57".

b. Description of Dam and Appurtenances. Slatersville Reservoir Middle Dam is a run-of-the-river dam constructed about 1886 as part of a mill complex. The use of the dams and reservoirs for the mill has been abandoned and the dam no longer serves its original intent.

Essentially the dam consists of a 150 ft. long ashlar masonry arched overflow section, with left and right ashlar masonry faced earth-fill abutments. To the left of the left abutment there is a filled-in canal. This canal once extended from the upper reservoir to the mill site located below the lower dam. The downstream slope of the overflow section has a slight batter and the upstream slope

(2) Develop a formal flood warning plan to follow in the event of an emergency, including round-the-clock monitoring during heavy precipitation.

(3) Institute procedures for an annual periodic technical inspection of the dam and its appurtenant structures.

7.4 Alternatives

The only practical alternative would be to breach the dam under the auspices of a registered professional engineer with due consideration of environmental effects.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Slatersville Reservoir Middle Dam DATE 23 Apr. & 10 May 1979

TIME 9:00 AM

WEATHER 23 Apr. Clear, Sunny
10 May Clear, Hot

W.S. ELEV. 232.8 U.S. ____ DN.S.

PARTY:

1. Peter B. Dyson
2. Pasquale E. Corsetti
3. Roger F. Berry
4. Carl J. Hoffman
5. James Reynolds
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrologic	Roger F. Berry	
2.	Hydraulic/Structural	Carl J. Hoffman	
3.	Soils and Geology	James Reynolds	
4.	General Features	Peter B. Dyson	
5.	General Features	Pasquale E. Corsetti	
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 April & 10 May 1979

PROJECT FEATURE Ashlar Masonry Dam NAME C. Hoffman

DISCIPLINE Structures NAME

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	232.6 MSL
Current Pool Elevation	232.8 MSL
Maximum Impoundment to Date	Not known
Surface Cracks	N/A
Pavement Condition	N/A
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	Appears Good
Horizontal Alignment	Appears Good
Condition at Abutment and at Concrete Structures	Appears Good
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Some on abutments (minor)
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	Inaccessible, could not observe
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None evident
Toe Drains	None evident
Instrumentation System	None evident

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 Apr. & 10 May 1979

PROJECT FEATURE Spillway NAME C. Hoffman

DISCIPLINE Structures NAME

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Approach Channel	Inaccessible
b. Weir and Training Walls	
General Condition of Concrete	Granite Block - Good weir not accessible
Rust or Staining	N/A
Spalling	N/A
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	None observed
Drain Holes	None evident
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	Yes
Floor of Channel	Not observed
Other Obstructions	None observed

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 April & 10 May 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
- Outlet Works - Control Tower	NA
- Outlet Works - Intake Channel and Intake Structure	NA
- Outlet Works - Transition and Conduit	NA
- Outlet Works - Outlet Structure and Outlet Channel	NA
- Outlet Works - Service Bridge	NA

APPENDIX B

ENGINEERING DATA

DIVISION OF HARBORS AND RIVERS

SURVEY OF DAMS IN RHODE ISLAND

Branch River Basin #46 Slatersville (Middle) Dam #3

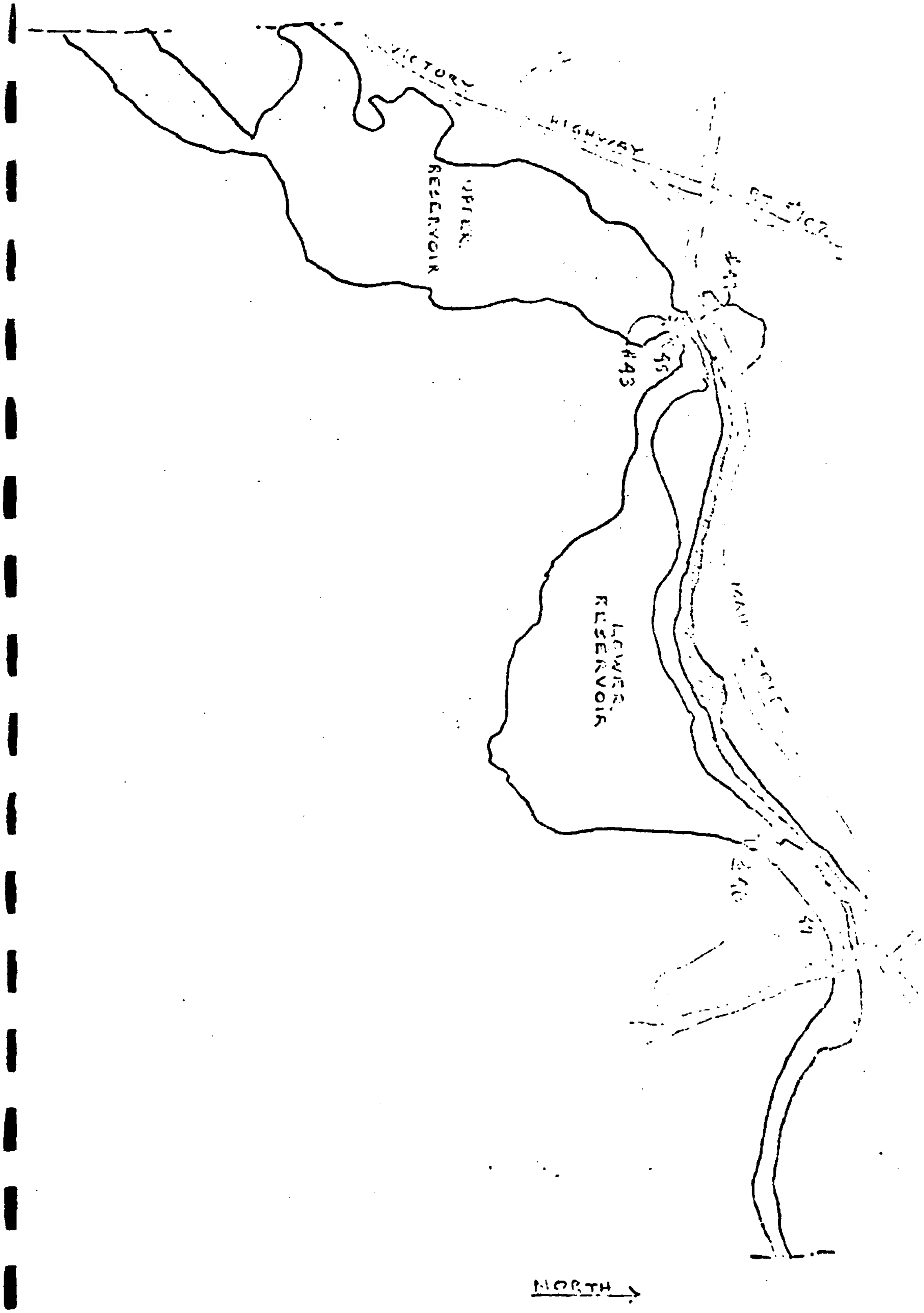
Drainage Area 93.9 Sq. Mi.

Pond Area 102 Acres

February 1948

Spillway 150' X 3.2' deep, capacity 7500 c.f.s.

Estimated extreme freshet 6028 c.f.s.



VICTORY
HIGHWAY
UPPER RESERVOIR
LOWER RESERVOIR
#43
NORTH

CITY OF FULL REPORT AS CONTAINED IN ANNUAL REPORTS

OF COMMISSIONERS OF DAMS AND RESERVOIRS.

1903 - Upper dam built of stone and appearing in good condition and safe. A long trench conveys the water to the mills. Total fall at Slatersville is 67 feet.

1907 - Plan showing the flow of the stream at this point and the Branch River during the flood of [illegible] this Department by the owners [illegible]. The company has a plan of their entire property which comprises some four dams and an effort is being made to secure a copy of it for office use and also towards studying the habits of the Branch River in the future. The four dams mentioned are constructions of solid masonry of ample proportions with spillways the entire width of the river and the whole work is in excellent condition being constantly repaired and kept up when necessary.

R.I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS AND RIVERS

SPECIAL INSPECTION REPORT

INSPECTED BY JOHN V. KEILY
E. H. FILKINS, PLANT E...

TOWN - NORTH SMITHFIELD

DAM NO 49 NAME SLATERSVILLE (MIDDLE) ON RIVER BRANCH RIVER WATERSHED BLACKSTONE

OWNER KENDALL COMPANY (SLATERSVILLE BRANCH)

ADDRESS SLATERSVILLE FINISHING CO., SLATERSVILLE, R. I. TEL. WICON. 130

REPORT ON—NEW CONSTRUCTION REPAIRS INSPECTION ONLY X

PLANS BY APPROVED CONTRACTOR

INSPECTION REPORT BY JOHN V. KEILY REASON ROUTINE DATE 6/20/...

TIMBER

SPILLWAY

TYPE

CONDITION CONDITION GOOD. MASSIVE CURVED MASONRY SPILLWAY, MEDIUM FALL, EXTENDS ACROSS ENTIRE RIVER. NO TRENCHES AT THIS DAM. NEEDS SOME POINTING ON ABUTMENTS AND FACE OF DAM. DRAW-OFF GATES THROUGH ABUTMENT AT NORTH END OF SPILLWAY NEEDS NEW STEM. SEE PLAN OVER. SO REPORTED BY E. H. FILKINS, PLANT ENGINEER.

DRAW-OFF GATE

NUMBER

CONDITION

TRENCHES & PUTTING

EMBANKMENT

TYPE

CONDITION

APPROACHES

EROSION

CRUSHED STONE

RIPRAP

PRESENT USE

WHO CONTROLS

WHO CONTACT AT TIME

INSTRUCTIONS LEFT

IN EMERGENCY CALL

DEPARTMENT OF NATURAL RESOURCES

DAM INSPECTION REPORT

DAM: 46 RIVER: Branch WATERSHED: Blackstone Branch

NAME: Slatersville Res/ Middle TOWN: N. Smithfield

OWNER:

Dudley Development Corp.
58 Hamlet Avenue
Woonsocket, RI 02895

REPORT ON: General Condition of Dam

REASON FOR INSPECTION: N.P.S.I.D. - Low/Small Hazard
Annual Inspection

INSPECTION BY:

Earle Prout
Carmine Asprinio

DATE OF INSPECTION: April 6, 1978

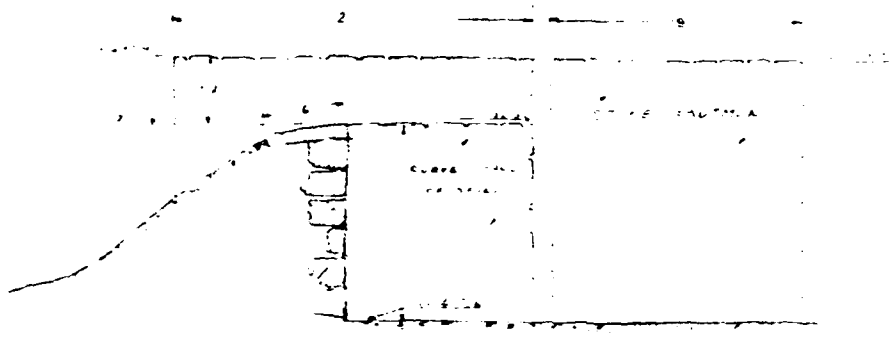
REPORT:

Crest of spillway appears to be in excellent condition. Earth-filled, masonry block-faced embankment showing no signs of erosion or scouring. Some pointing of blocks on downstream side of spillway could be done but not considered to be urgent.

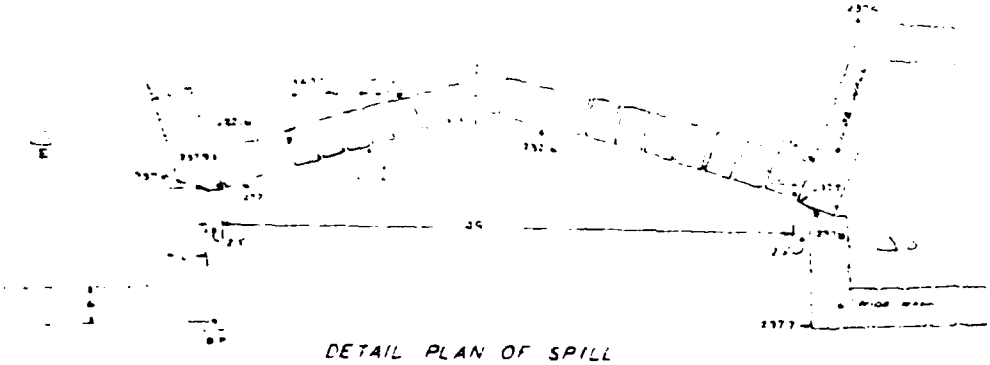
Dam has one draw-off gate which has been permanently closed since prior to 1939. Gate mechanism has been completely removed. (see photo 1)

Comments

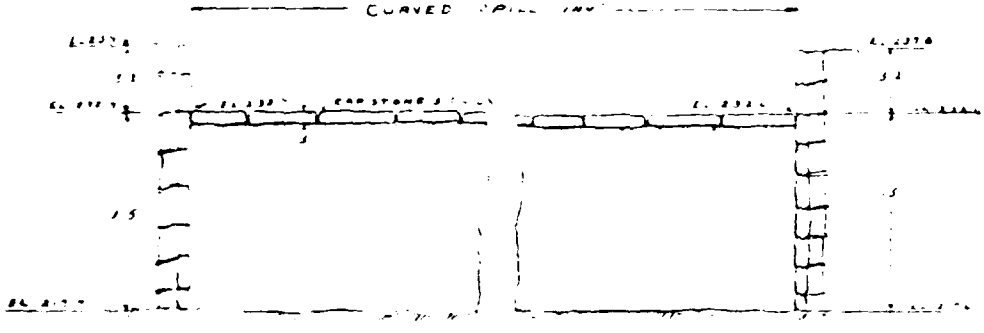
Dam in good condition. No remedial action is suggested.



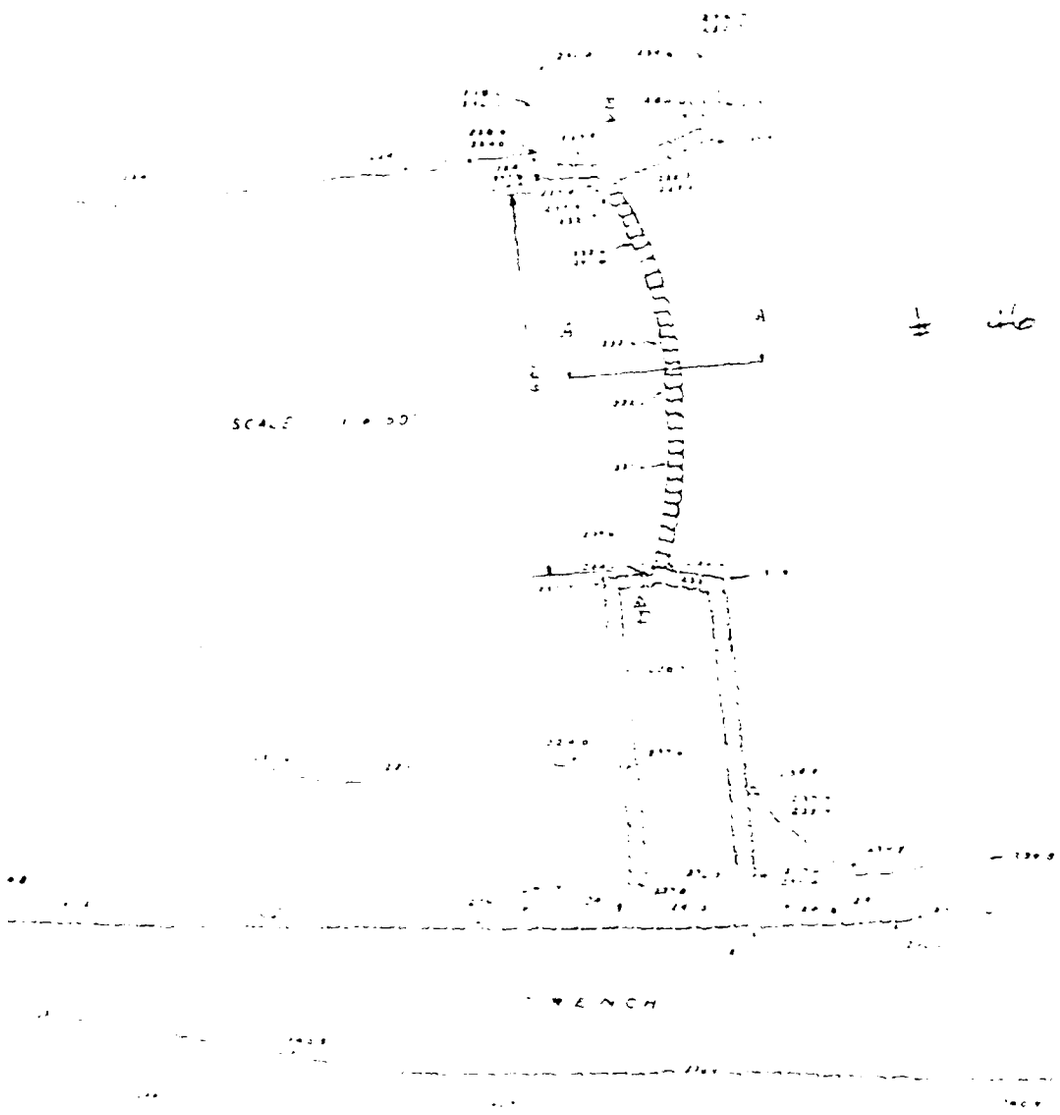
SECTION A - A
SCALE



DETAIL PLAN OF SPILL
SCALE



ELEVATION OF SPILL
SCALE
LOOKING DOWN STREAM



46

48 SLATERSVILLE

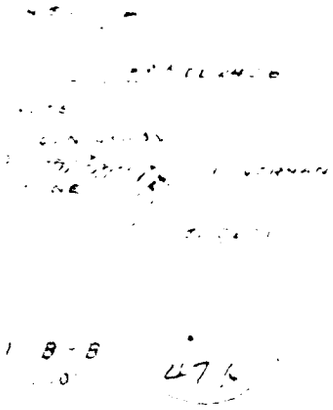
MIDDLE — #2

46

DATE

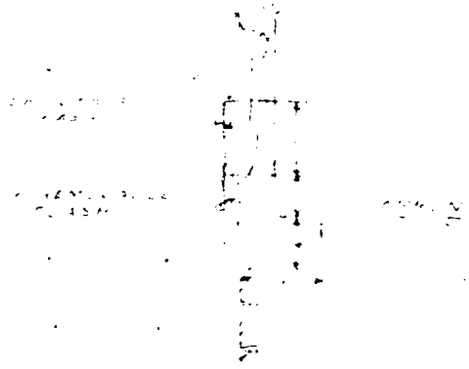
PLAN NO BR.-48

2



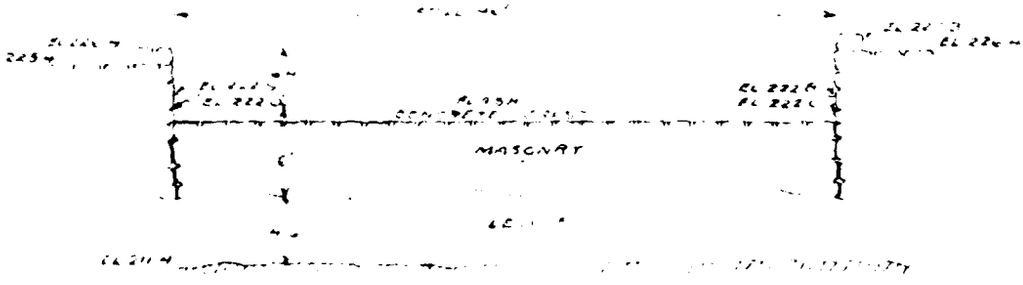
B - B

47 C



DETAIL - FLASHBOARD CONSTRUCTION
SCALE 1 - 2

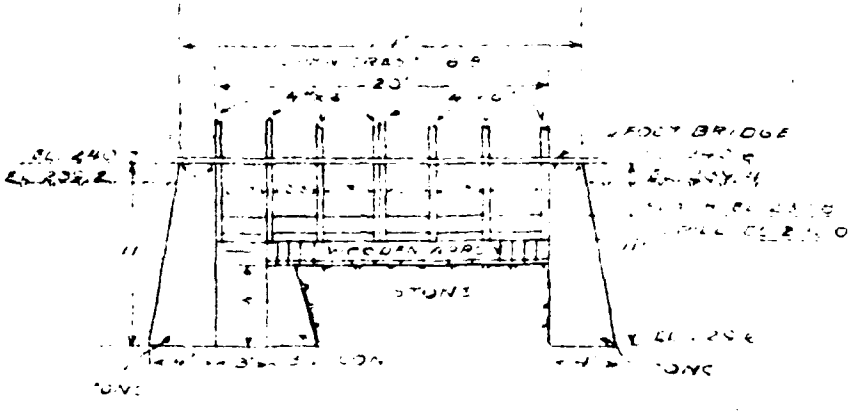
47 A



ELEVATION OF SPILL ~~SCALE~~
SCALE 1" = 10'
LOOKING UPSTREAM

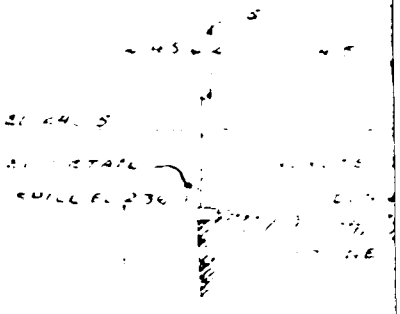
47 B

47A / 47B

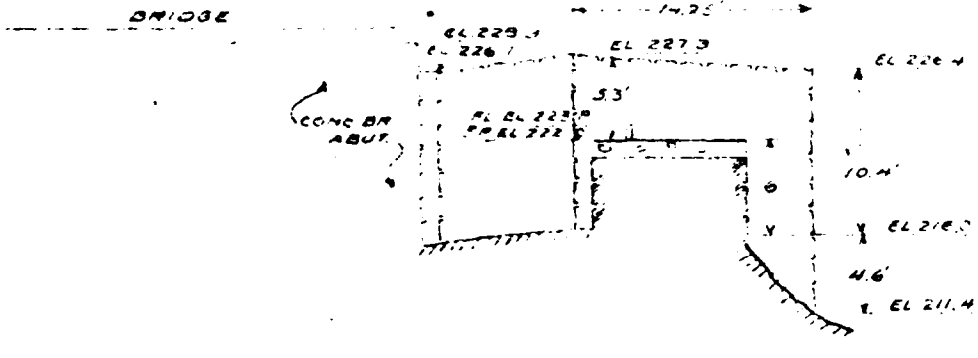


ELEVATION SPILL SP
FROM DOWNSTREAM
SCALE 1" = 10'

47 A

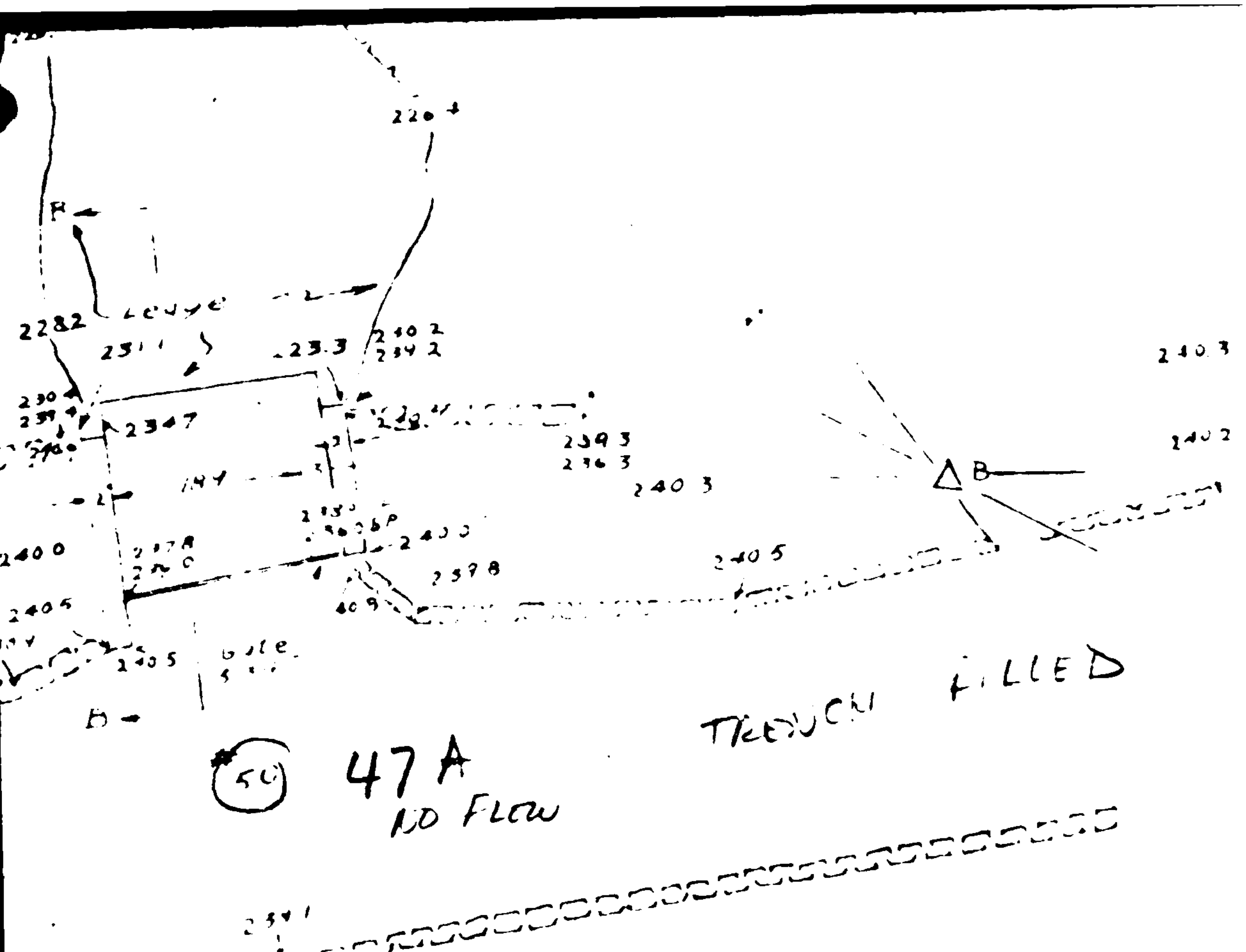


SECTION B - B
SCALE 1" = 10'



SECTION D - D
SCALE 1" = 10'

47 B



47A, 47B

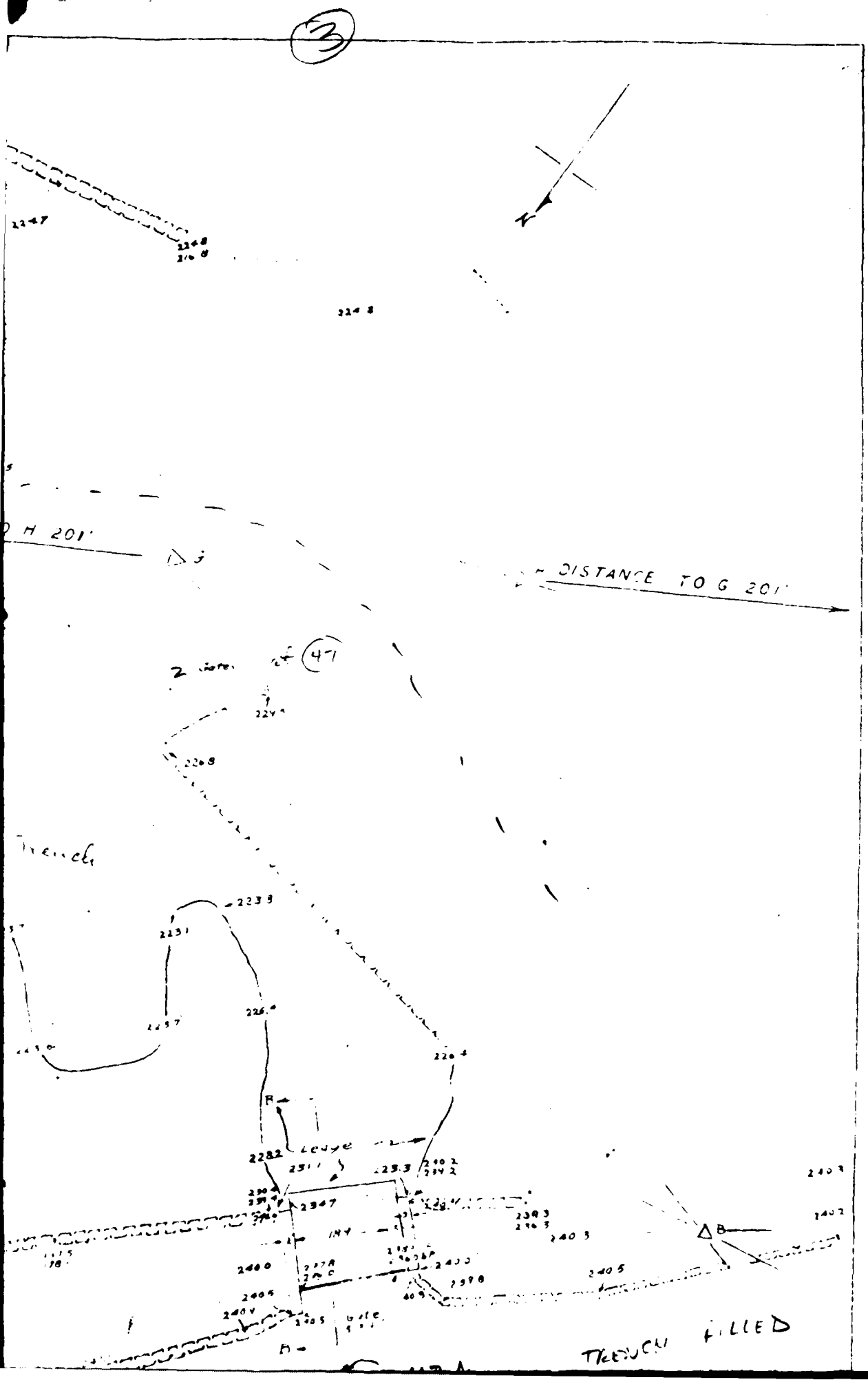
~~50~~ ~~50-A~~

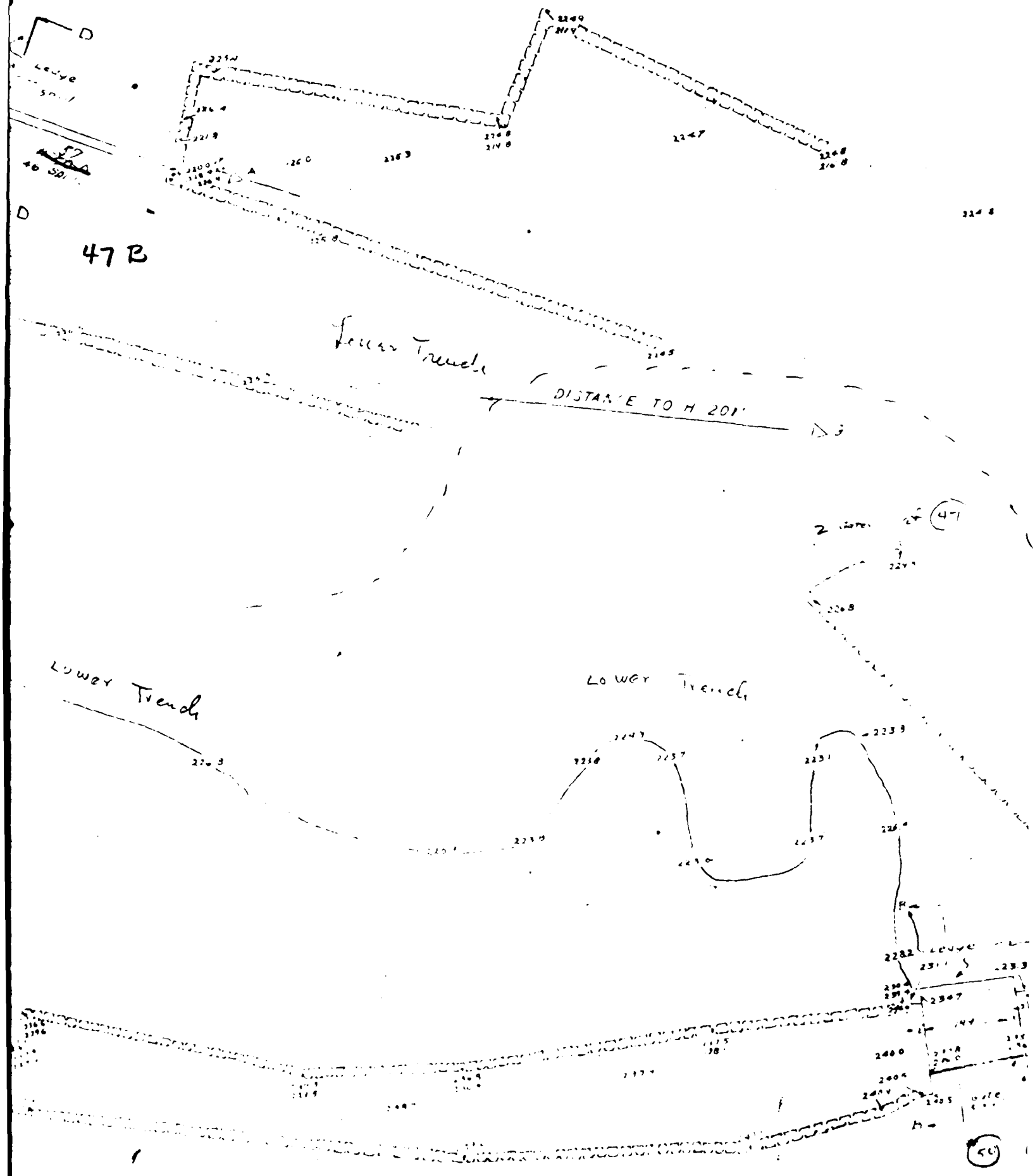
SLATERSVILLE

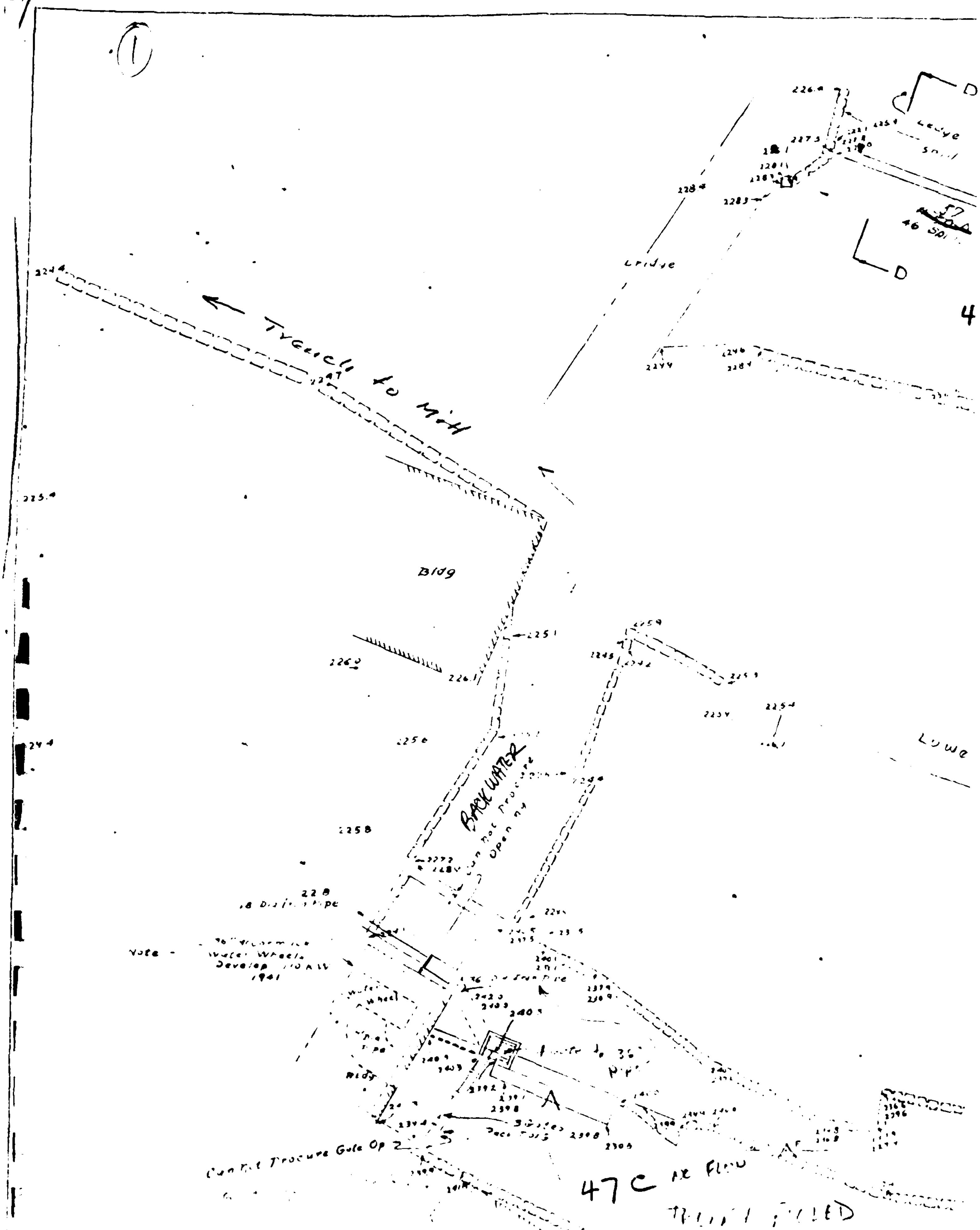
R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS & RIVERS
BY THE
WORKS PROJECTS ADMINISTRATION

PLAN NO. B-~~50~~ 47A
~~50-A~~ 47B

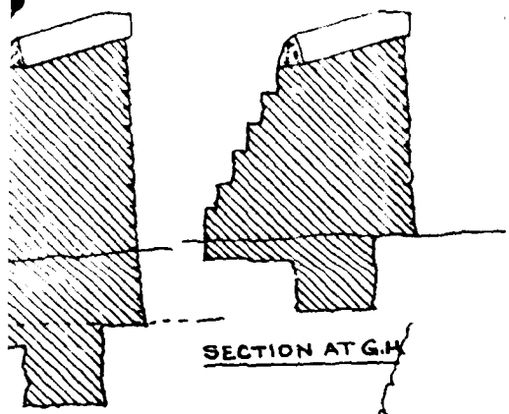
4


3
H 201'
DISTANCE TO G 201'
2 inch of (47)
Trench
Levee
INV
B
TRENCH FILLED


47 B
Lower Trench
DISTANCE TO H 201'
Lower Trench
Lower Trench
Levee
Levee

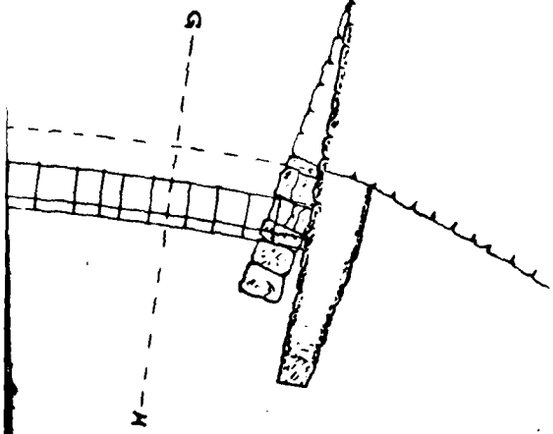


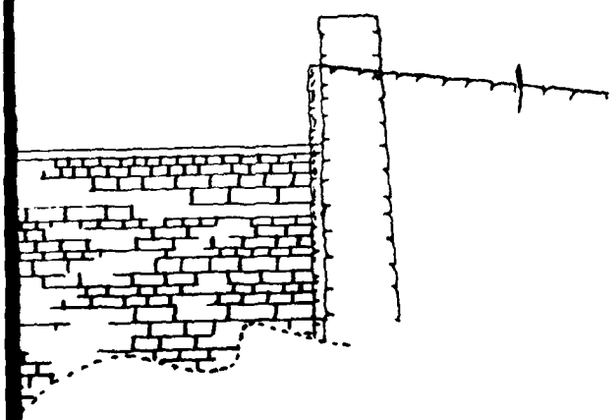
Bldg
BACKWATER
Water Wheels
1941
A
D
47C



SECTION AT G.H

ON AT C.D.

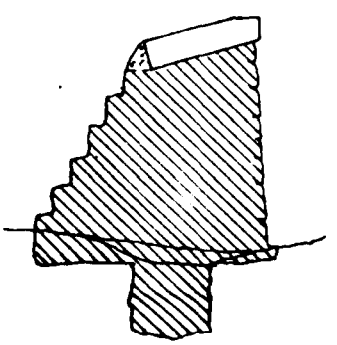




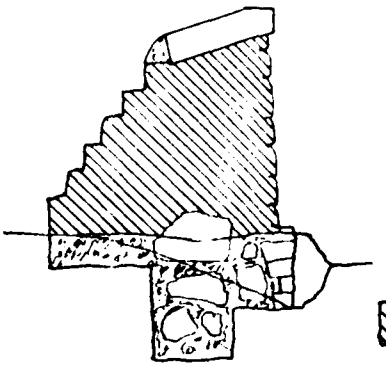
Dam #47

New #47 (1946)

Dam #47 B 3-20

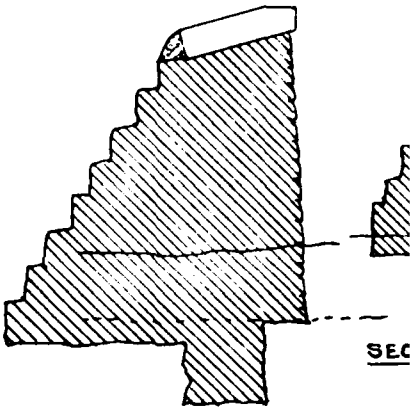


SECTION AT A-B



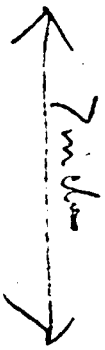
SECTION AT E.F.

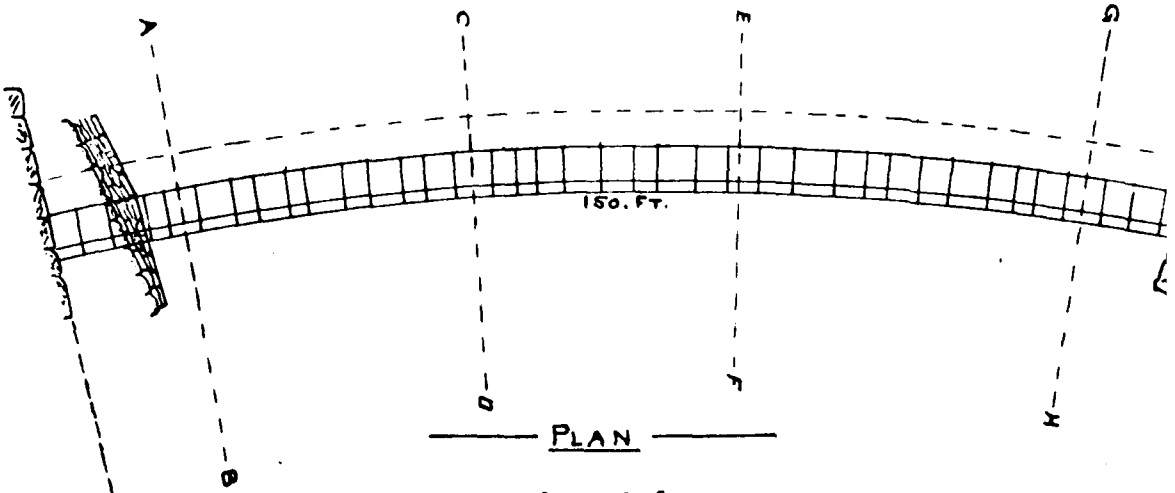
SCALE 0 6 FEET.



SECTION AT C.D.

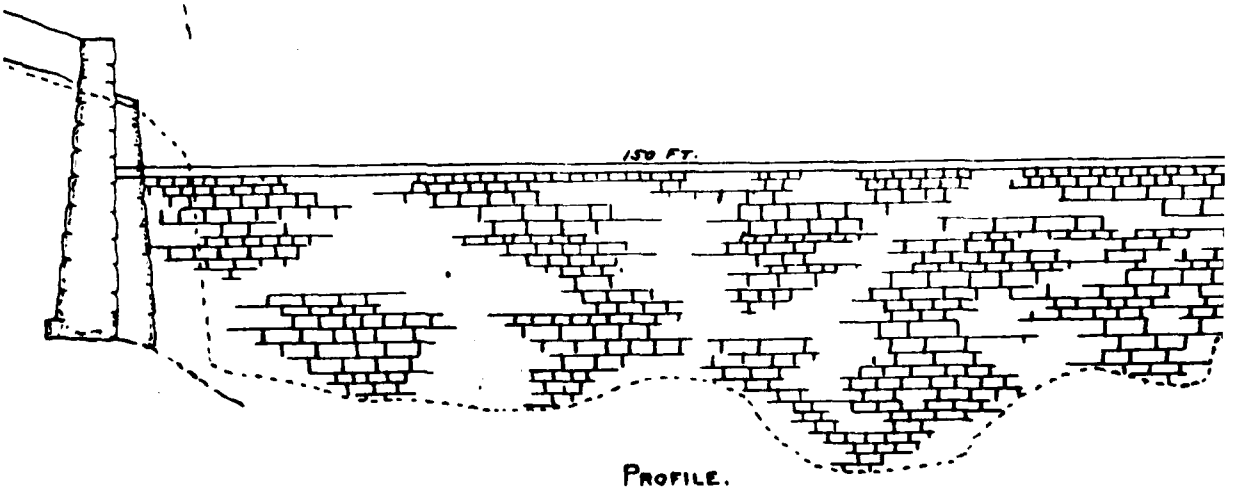
SEC





PLAN

SCALE 20 10 5 0 FEET.



PROFILE.

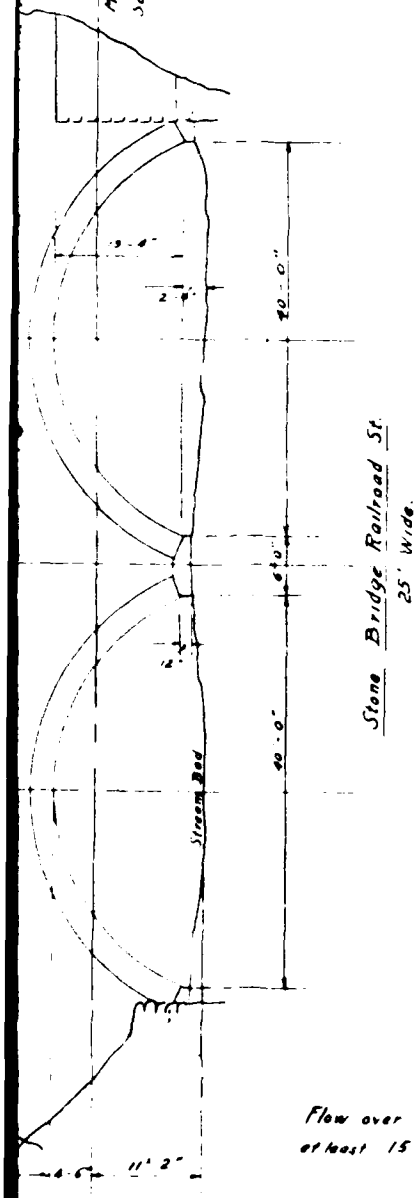
STONE DAM AT SLATERSVILLE R.I.

J. W. ELLIS. C.E.

JUNE-1895.

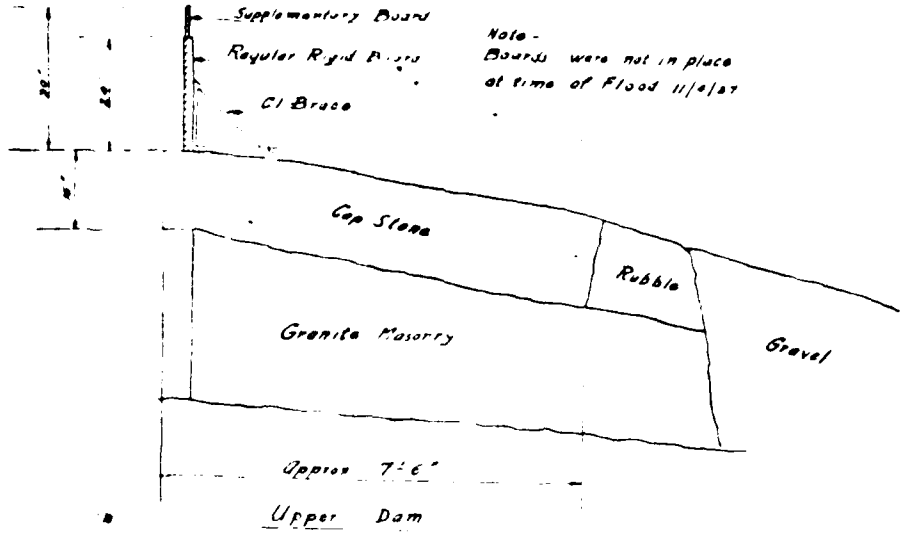
350

(1)



Stone Bridge Railroad St.
25' Wide.

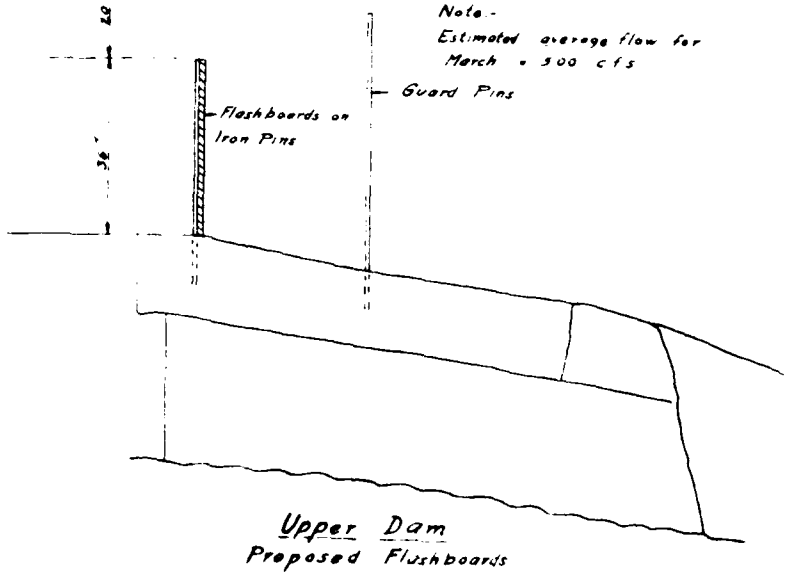
Flow over dams measured at least 15 ft Back of Face



Note -
Boards were not in place at time of Flood 11/8/27

Upper Dam
Present Flashboards & Section of Crest.

30" Above Board = 2000 c.f.s. Probable Usual Spring Flow
24" Above Board = 1600 c.f.s.
Flood Level 11/8/27 (No Boards) ...mf on Lower Dams



Note -
Estimated average flow for March = 300 c.f.s

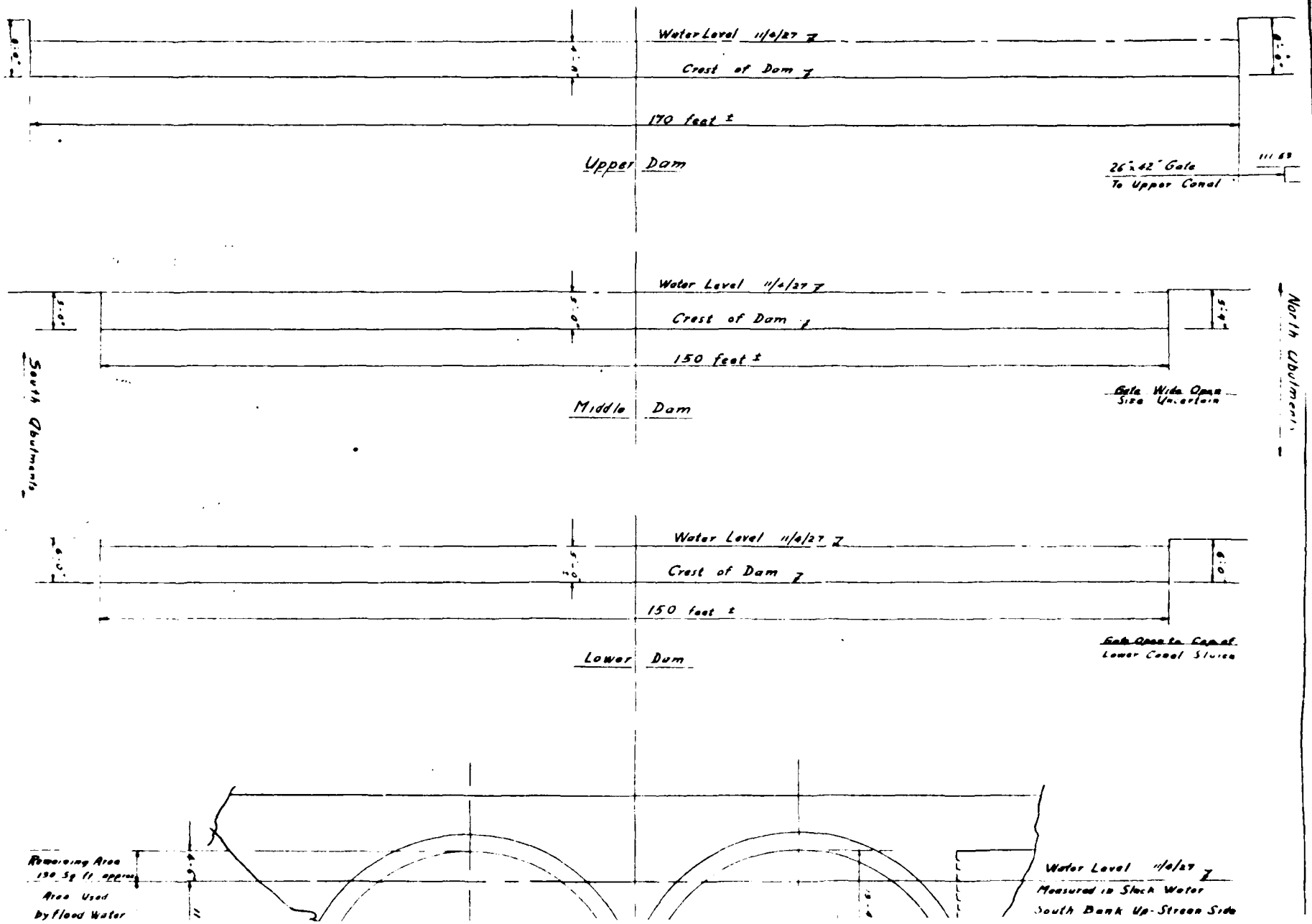
Upper Dam
Proposed Flashboards

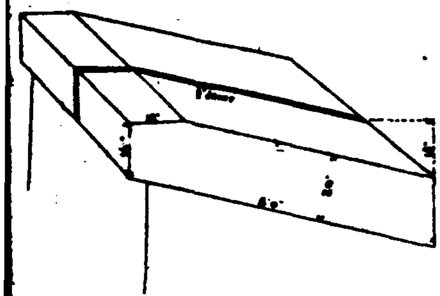
SLATERSVILLE FINISHING CO.
NOV. 8, 1927.

X-14

Div. 2's 43-47

1 (2)


Water Level 11/6/27 ℄
Crest of Dam ℄
170 feet ±
Upper Dam
26' x 42' Gate
To Upper Canal
Water Level 11/6/27 ℄
Crest of Dam ℄
150 feet ±
Middle Dam
Gate Wide Open
Size Uncertain
South Abutment
North Abutment
Water Level 11/6/27 ℄
Crest of Dam ℄
150 feet ±
Lower Dam
Gate Open to Canal
Lower Canal Sluice
Remaining Area
150 Sq ft approx
Area Used
by Flood Water
Water Level 11/6/27 ℄
Measured in Stock Water
South Bank Up-Stream Side



Section of Cap-stone

pecification

be built for John W. Slater North Smithfield, R.I.

so called) about one mile above Slatersville
cleaned of all earth, loose stone, roots etc. to the solid rock or ledge

surface of the ledge to such depth as may be directed by the
d dimensions as shown on plan and shall consist of well
llhead, to be laid close in cement mortar and bedded
oughly filled and flushed up with cement mortar, a head-
than eighteen (18) inches in thickness to receive coping
l ashlar work, pointed on beds and builds with rock face, and to lay
less than eighteen (18) inches in thickness. The horizontal joints
ey shall be laid with regard to breaking joints in the adjoin-
ge four (4) feet back), the face work herein described shall be
aking so as to insure a perfect piece of work.

e cut to the dimensions given on the plans to fit on beds and
ork and shall project one (1) inches over the face of the stone
e set . into the course below, said dowels being thoroughly
in Portland Cement and vertical joints to be carefully grout-

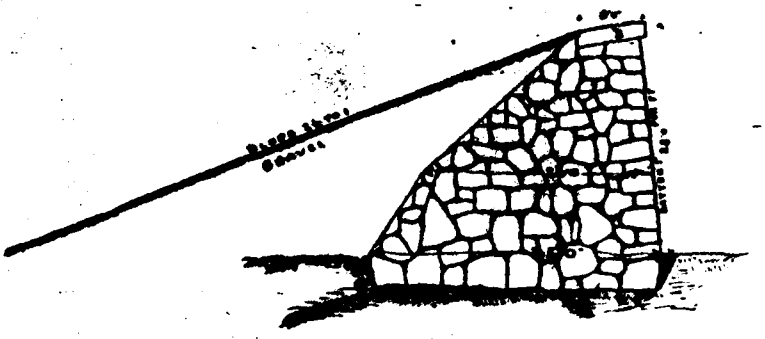
draulic Cement subject to the test and approval of the Engineer
part cement to two parts clean sharp sand, mixed fresh for

sidered as meaning John H. Ellis or his duly authorized

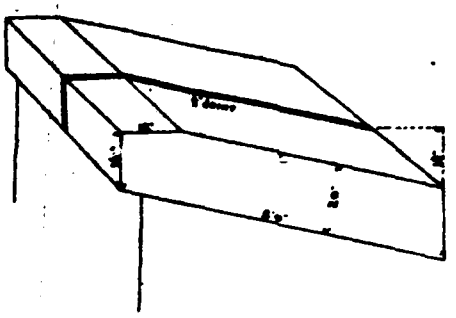
(4)

B
3-19

DAM #43



Section through A.A.



Section of Cap-ston

Scale 1"-10'.

Specification

Specification for a stone Dam to be built for John H. Platt. North Lewis

The dam is to be located on the Branch River (so called) about one mile above Slatersville

The foundation and approaches shall be thoroughly cleaned of all earth, loose stone, roots and underneath

The foundations for the dam shall extend below the surface of the ledge to such depth as the Engineer in charge, and shall be built to the form and dimensions as shown on plans, and [illegible] manner with the exception of the Bedstead, to be laid close in cement [illegible] and all interstices to be thoroughly filled and flushed, ends and [illegible] will be laid at top of stone of not less than eighteen (18) inches in thickness

The faces of the bedstead to be of Granite or coursed ashlar work, pointed on both sides and built [illegible] not standing on half (½) inch or course shall be of less than eighteen (18) inches in thickness [illegible] shall be laid and pointed joints perpendicular thereto, they shall be laid with regard to the [illegible] course one fifth (⅕) of face to be headers of full size from (4) feet back, the face work [illegible] thoroughly bonded with the masonry that forms the backing so as to insure a perfect [illegible]

The faces to be pointed with Portland Cement.

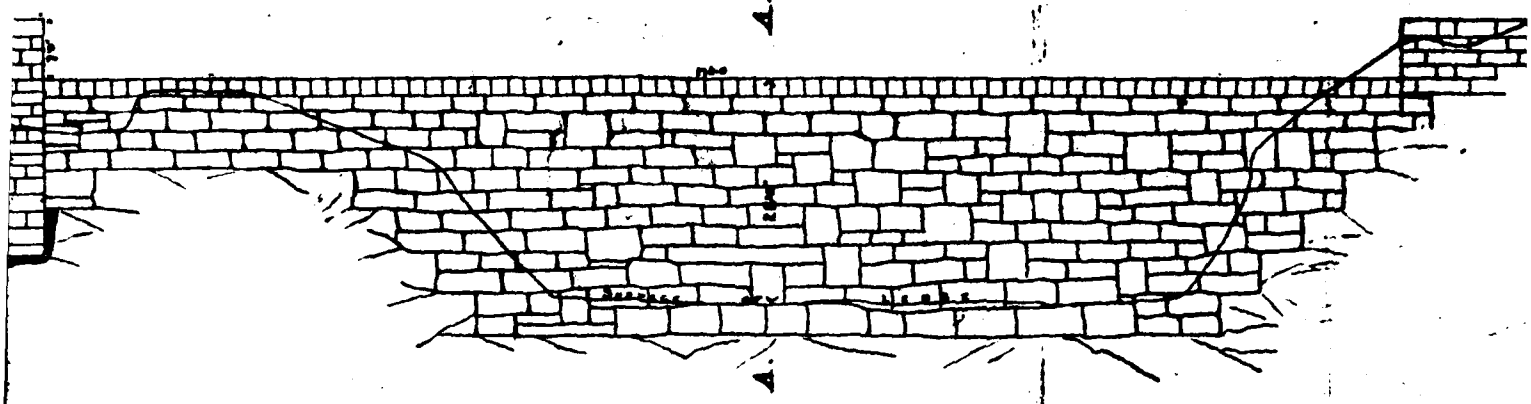
The coping or rubble stone of the dam shall be cut to the dimensions given on the [illegible] course to be of the joints not exceeding one half (½) inch and shall project one (1) inches [illegible] They shall be dressed with at least two (2) chisels set [illegible] into the course below, said [illegible] after being set shall be cut in Portland Cement and vertically [illegible] with the course.

The Cement used to be of the best quality Hydraulic Cement subject to the test of [illegible] in charge, to be mixed in the proportions of one part cement to two parts clean sharp [illegible] the work at least one hour immediately after.

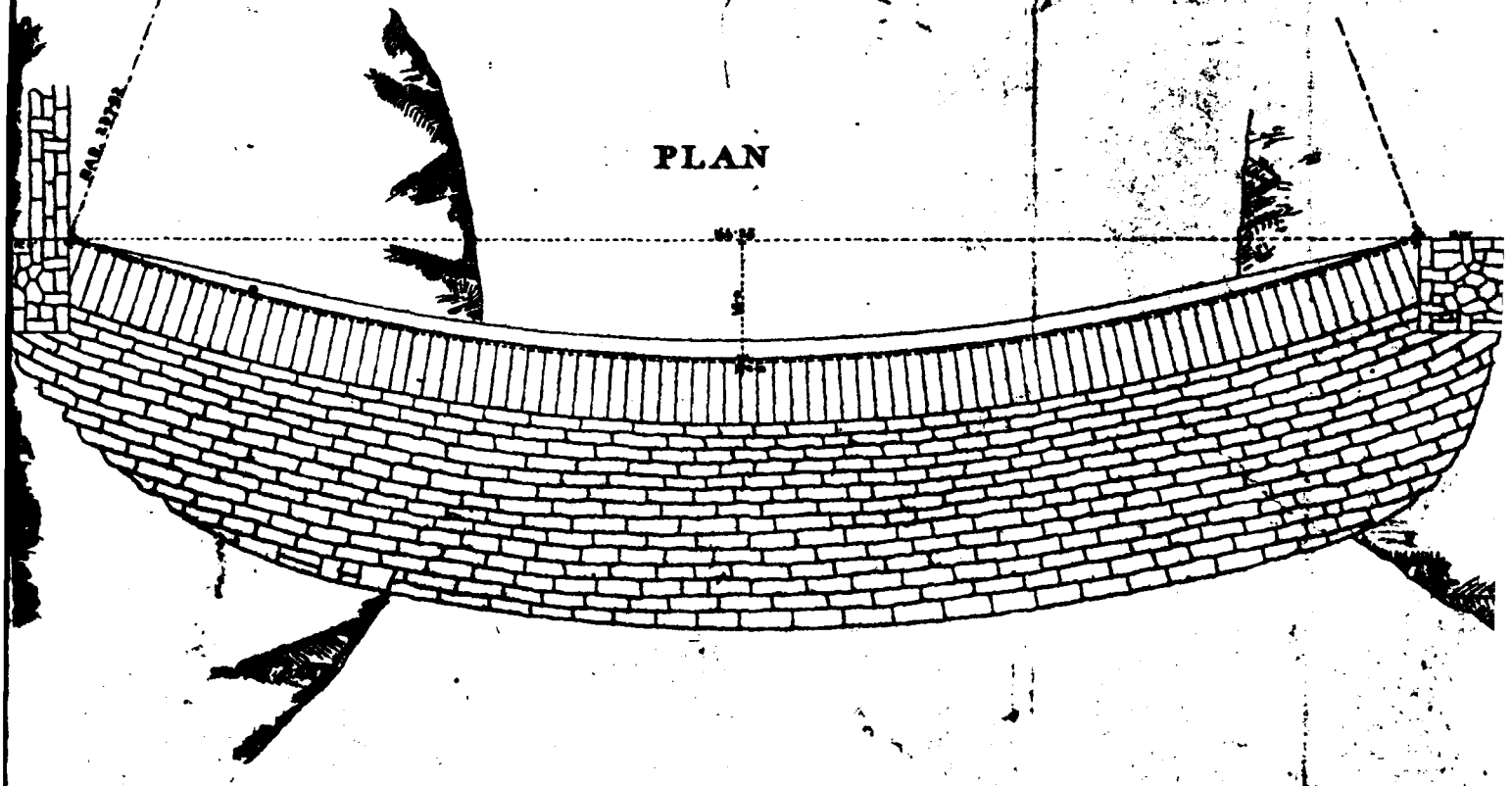
Where the word Engineer is used it is to be considered as meaning John H. Ellis [illegible] agent.

(B)

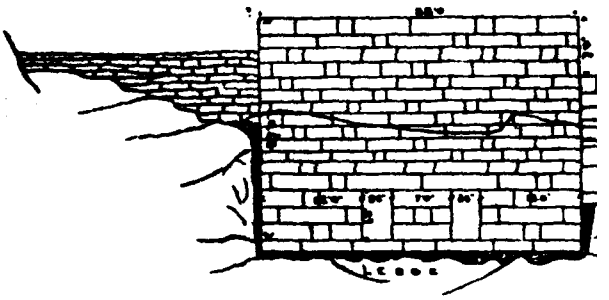
Elevation



PLAN



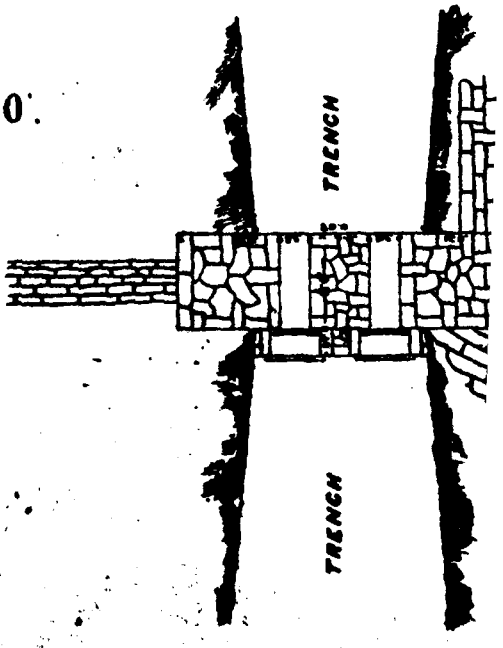
(2)



PLAN
of
PROPOSED DAM
for
JOHN W. SLATER.
SLATERSVILLE R.I.
1886

J.W. Ellis C.E.
Woonsocket R.I.

Scale 1" - 10'.



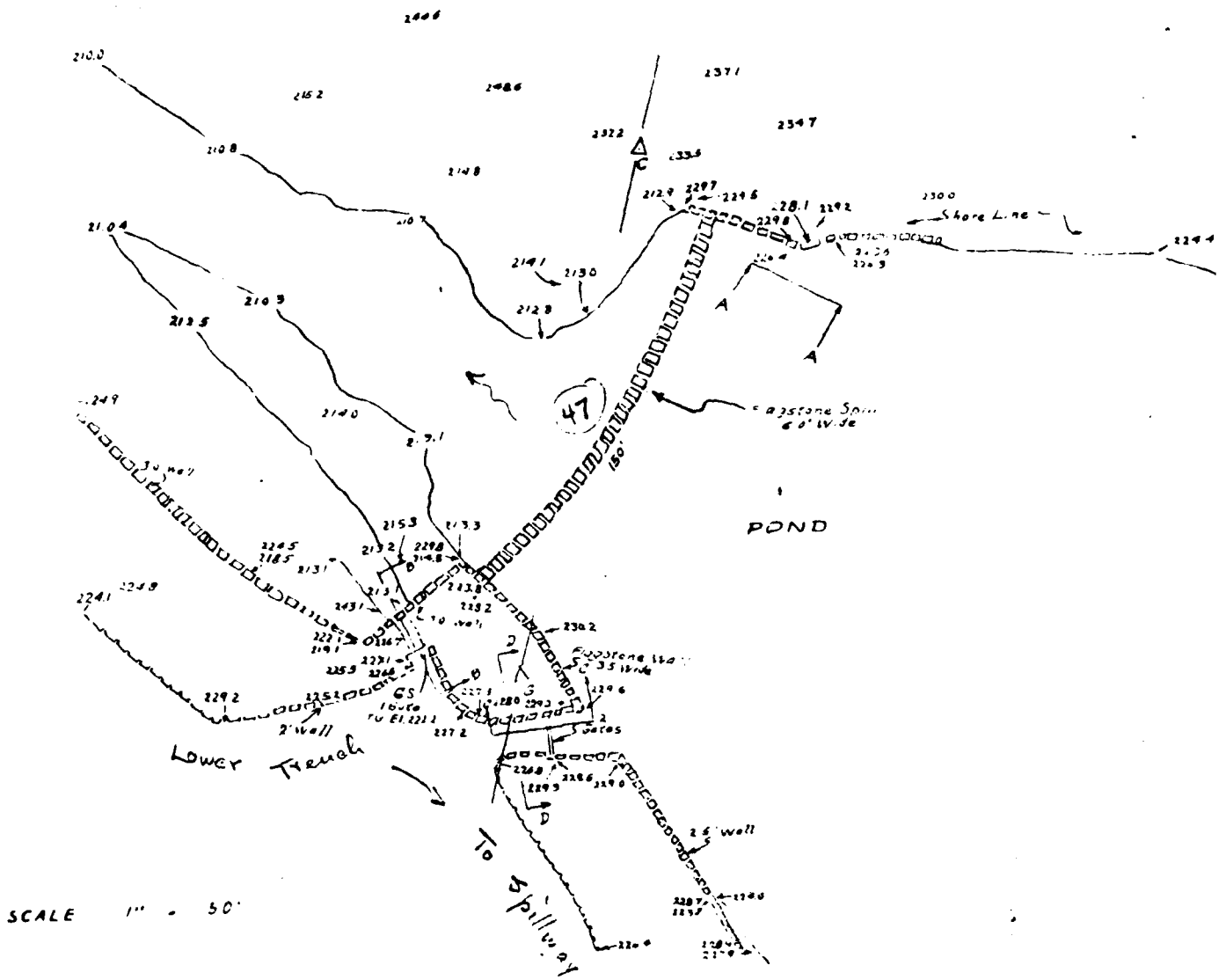
47A / 47B

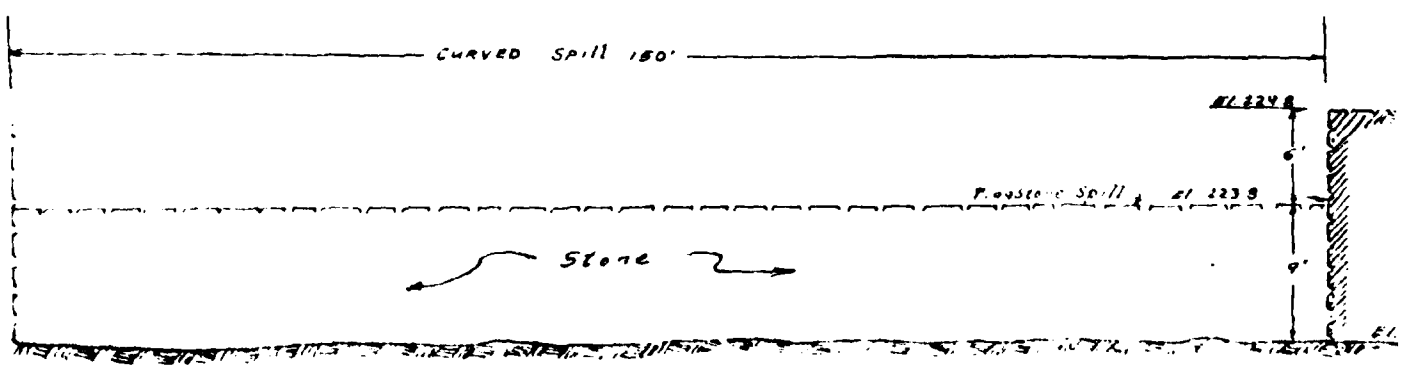
50 ~~51~~ SLATERSVILLE

R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS & RIVERS
BY THE
WORKS PROGRESS ADMINISTRATION

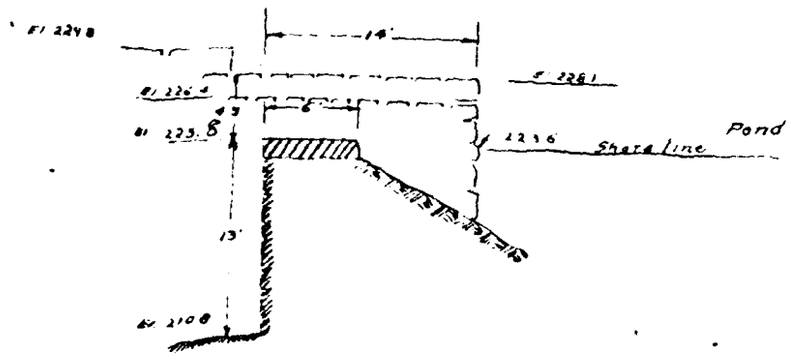
DATE

PLAN NO. B-~~50~~ 47A / ~~51~~ 47B





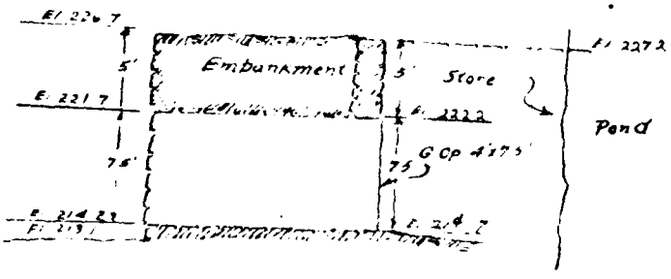
ELEVATION OF SPILL AT CHORD
SCALE 1" = 10'



SECTION A - A
SCALE 1" = 10'

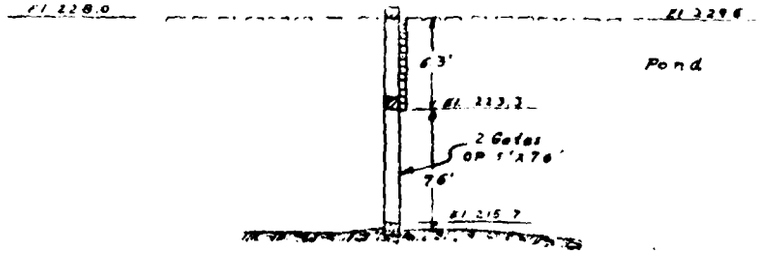
47

El 229.6



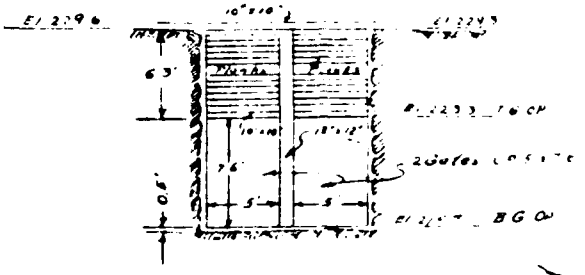
SECTION B - B
SCALE 1" = 10'

47



SECTION C - C
SCALE 1" = 10'

(2)



ELEVATION D-D
SCALE 1" = 10'

47

El 2292
Pond

El 2296
Pond
El 2293
2 Gates

47 /

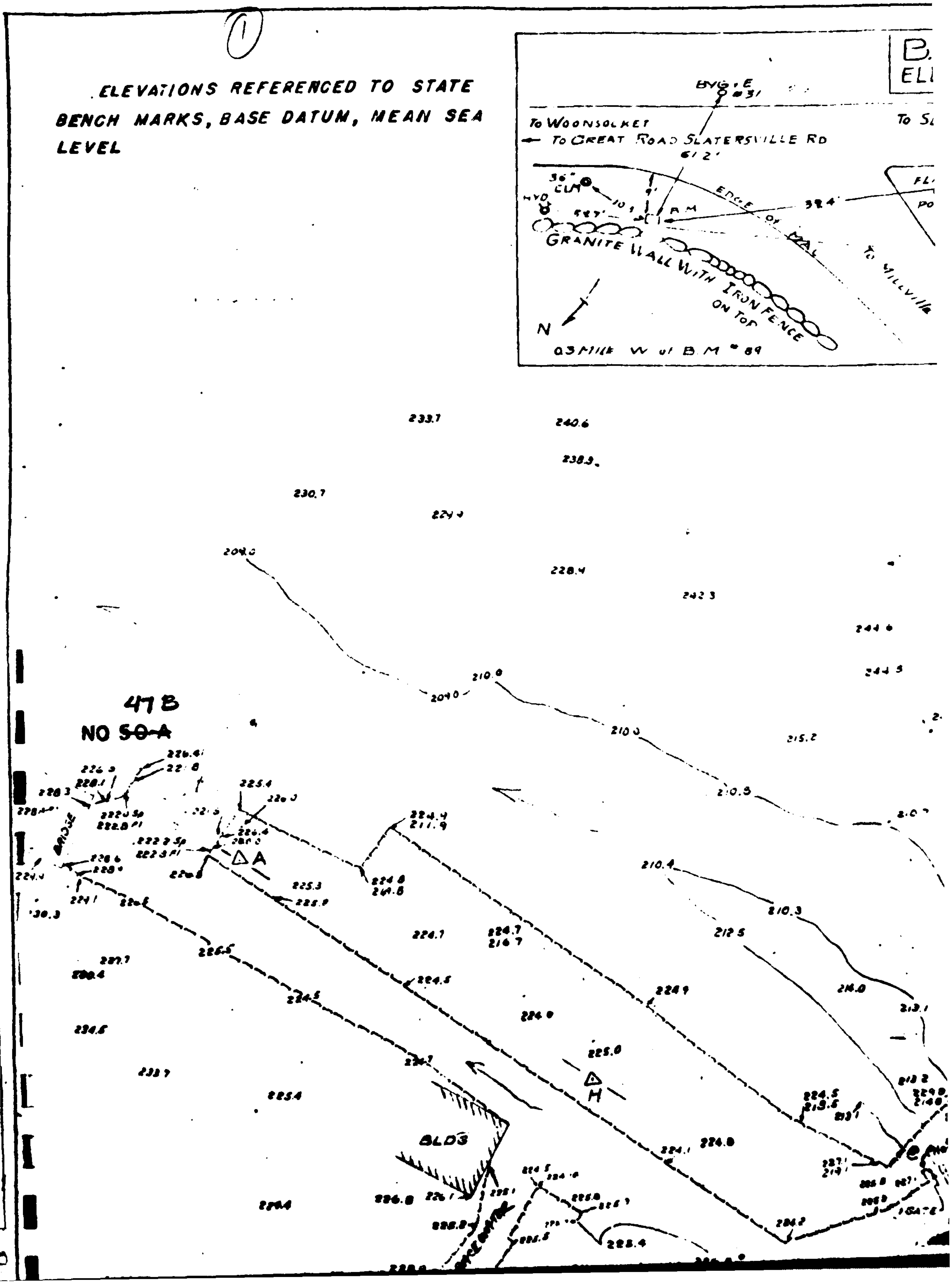
49 SLATERSVILLE
LOWER - #4

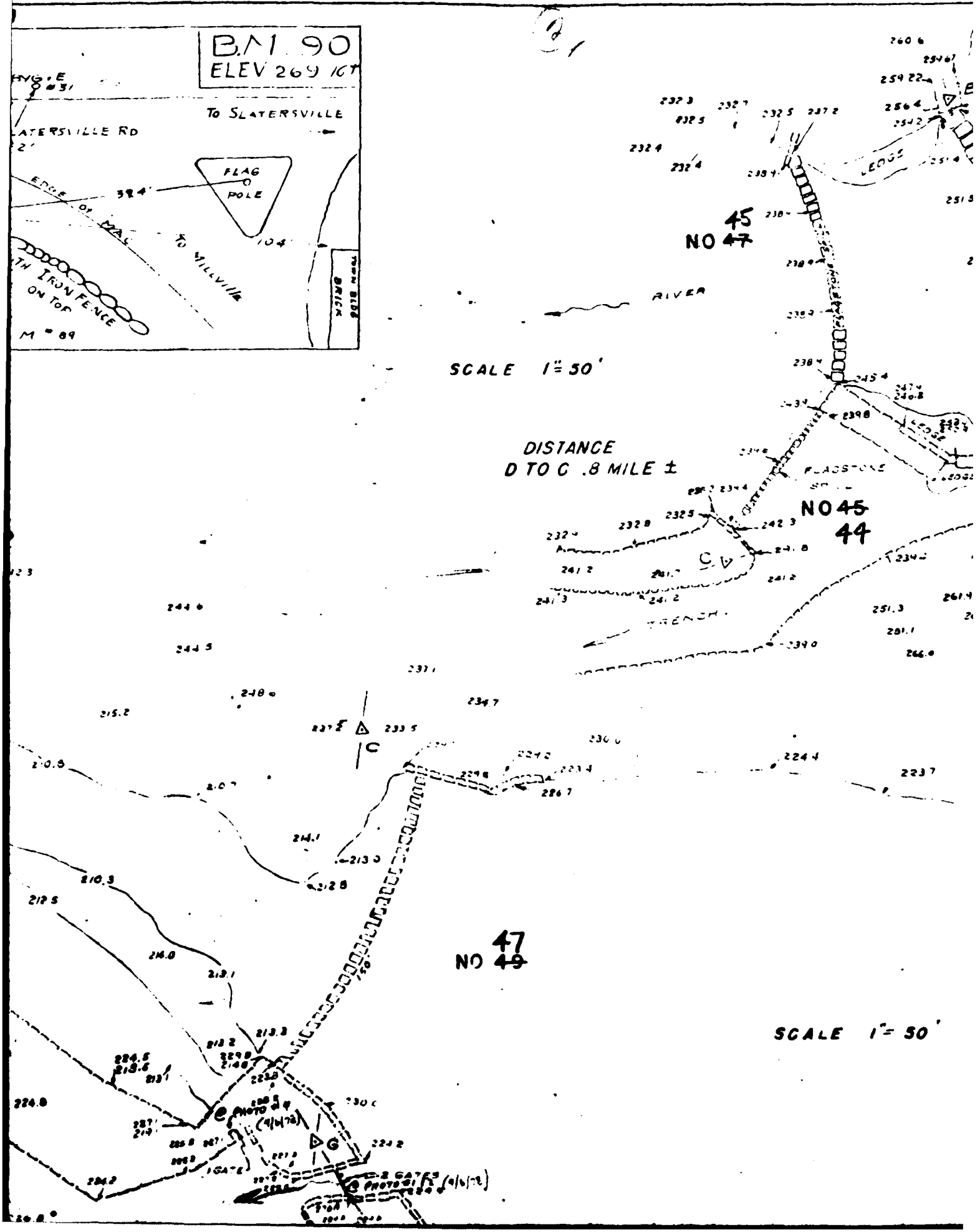
R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS & RIVERS
BY THE
WORKS PROJECTS ADMINISTRATION 47

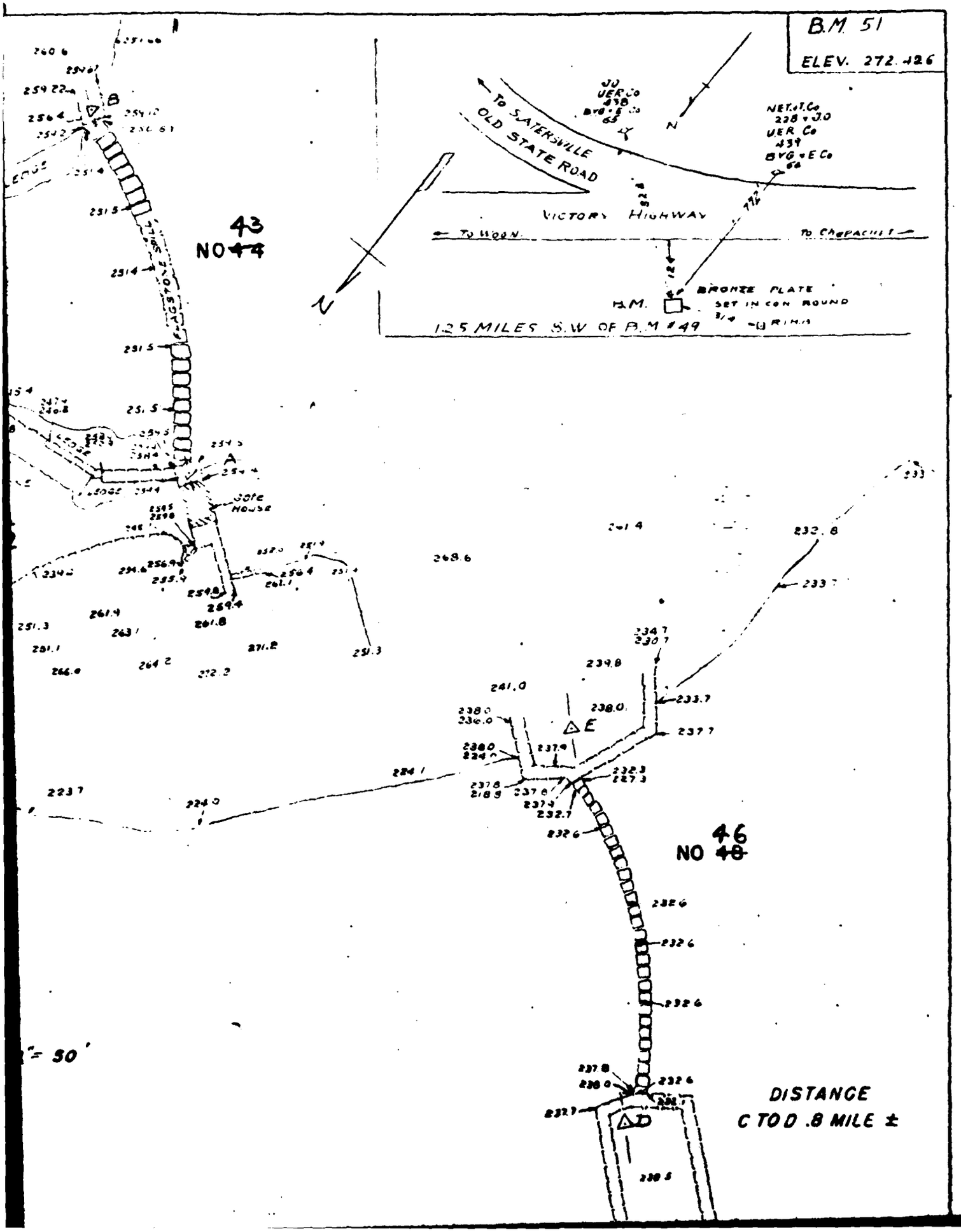
DATE 1-16-41 | PLAN NO. B-49

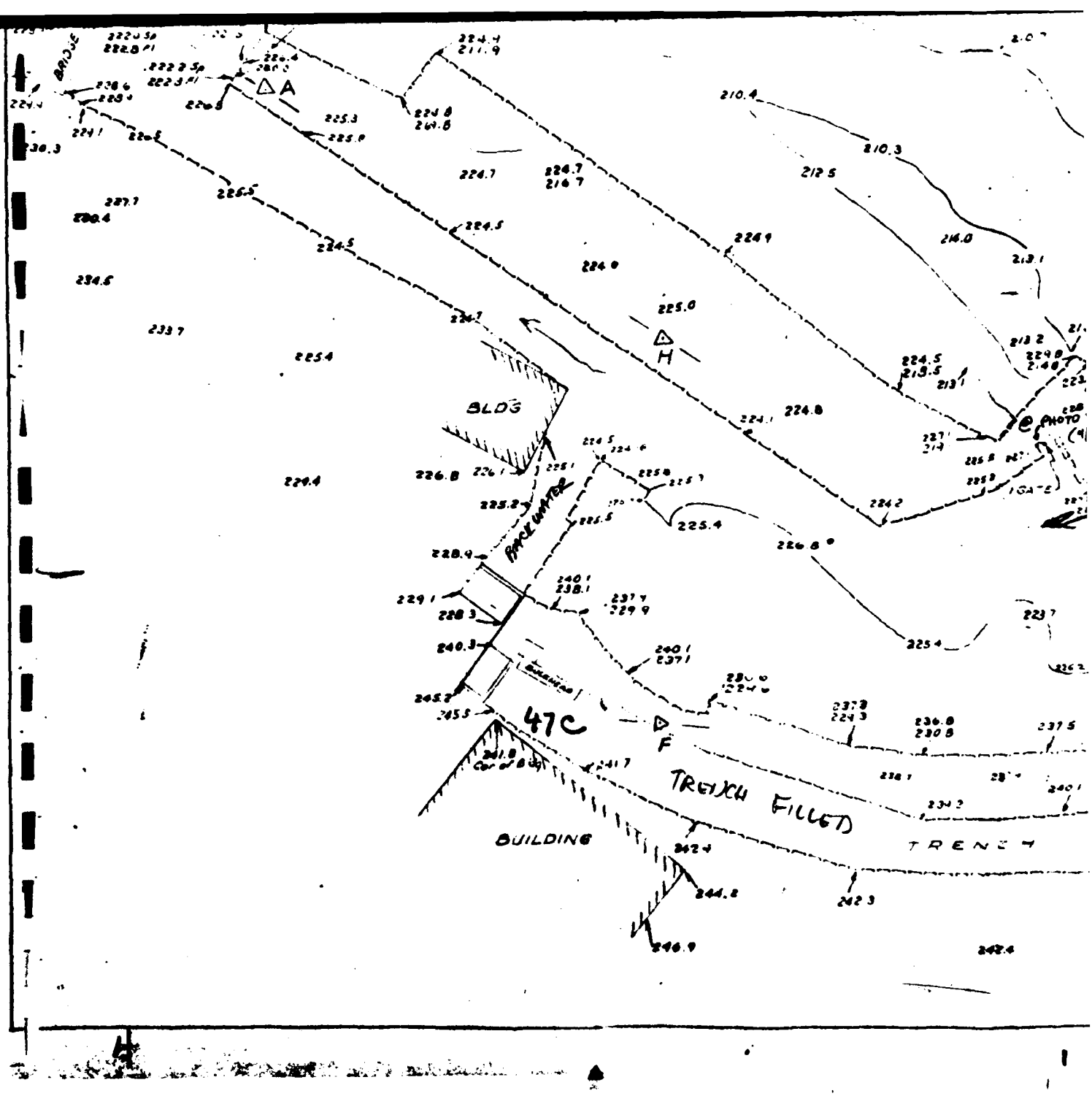
DRWN. J.R. A.P.

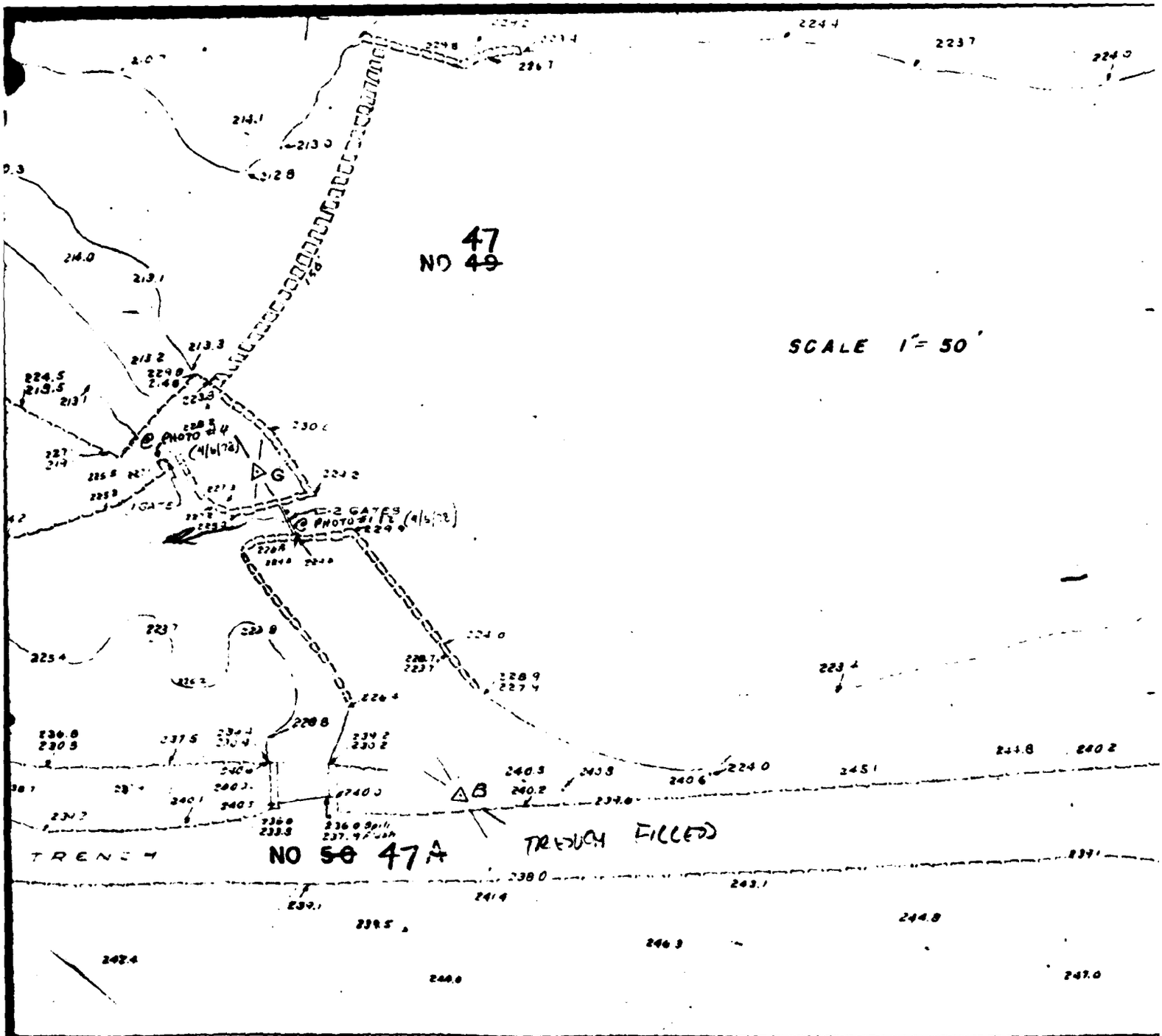
(3)


1
ELEVATIONS REFERENCED TO STATE BENCH MARKS, BASE DATUM, MEAN SEA LEVEL
To WOONSOCKET
TO GREAT ROAD SLATERSVILLE RD
GRANITE WALL WITH IRON FENCE ON TOP
EDGE OF
N
0.3 MILE W of B.M. 89
47 B
NO 50-A
BRIDGE
BLDG
233.7
240.6
238.3
230.7
228.4
242.3
210.0
210.3
212.5
225.0
225.4

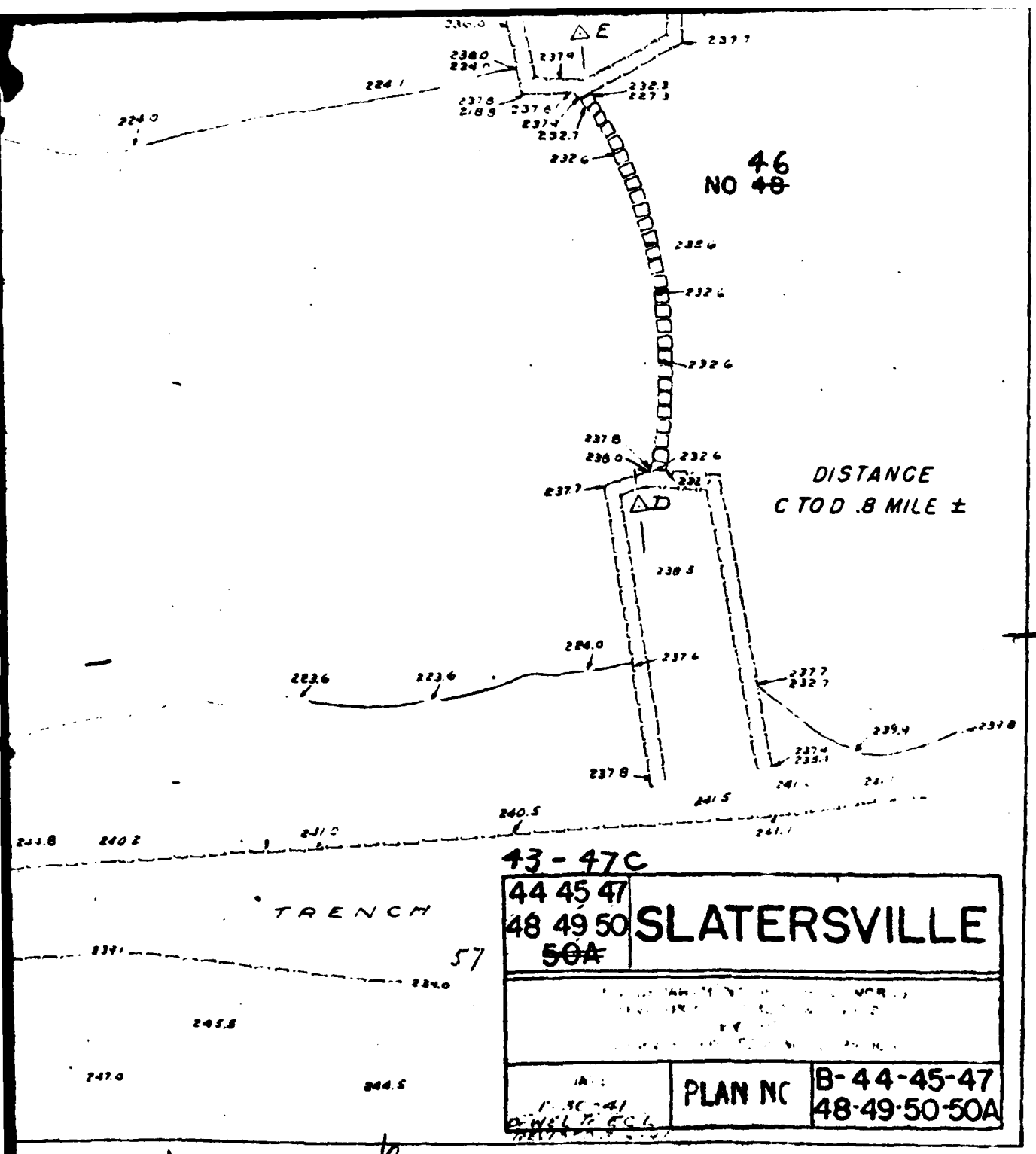

B.M. 90
ELEV 269.16'
To SLATERSVILLE
ATERSVILLE RD
FLAG POLE
EDGE OF MAC
TO MILLVILLE
TH IRON FENCE ON TOP
M = 89
BRICK
RIVER
SCALE 1" = 50'
DISTANCE D TO C .8 MILE ±
NO 45
NO 47
NO 45
44
NO 47
49
SCALE 1" = 50'


B.M. 51
ELEV. 272.426
TO SATERSVILLE
OLD STATE ROAD
VICTORY HIGHWAY
TO WOODBRIDGE
TO CHAPACHULA
B.M.
BRONZE PLATE
SET IN CON ROUND
1.25 MILES S.W. OF B.M. #49
43
NO 44
46
NO 48
GATE HOUSE
A
B
D
E
DISTANCE
C TO D .8 MILE ±


BASE
A
H
BLDG
BACK WATER
47C
F
TRENCH FILLED
BUILDING
TRENCH
PHOTO

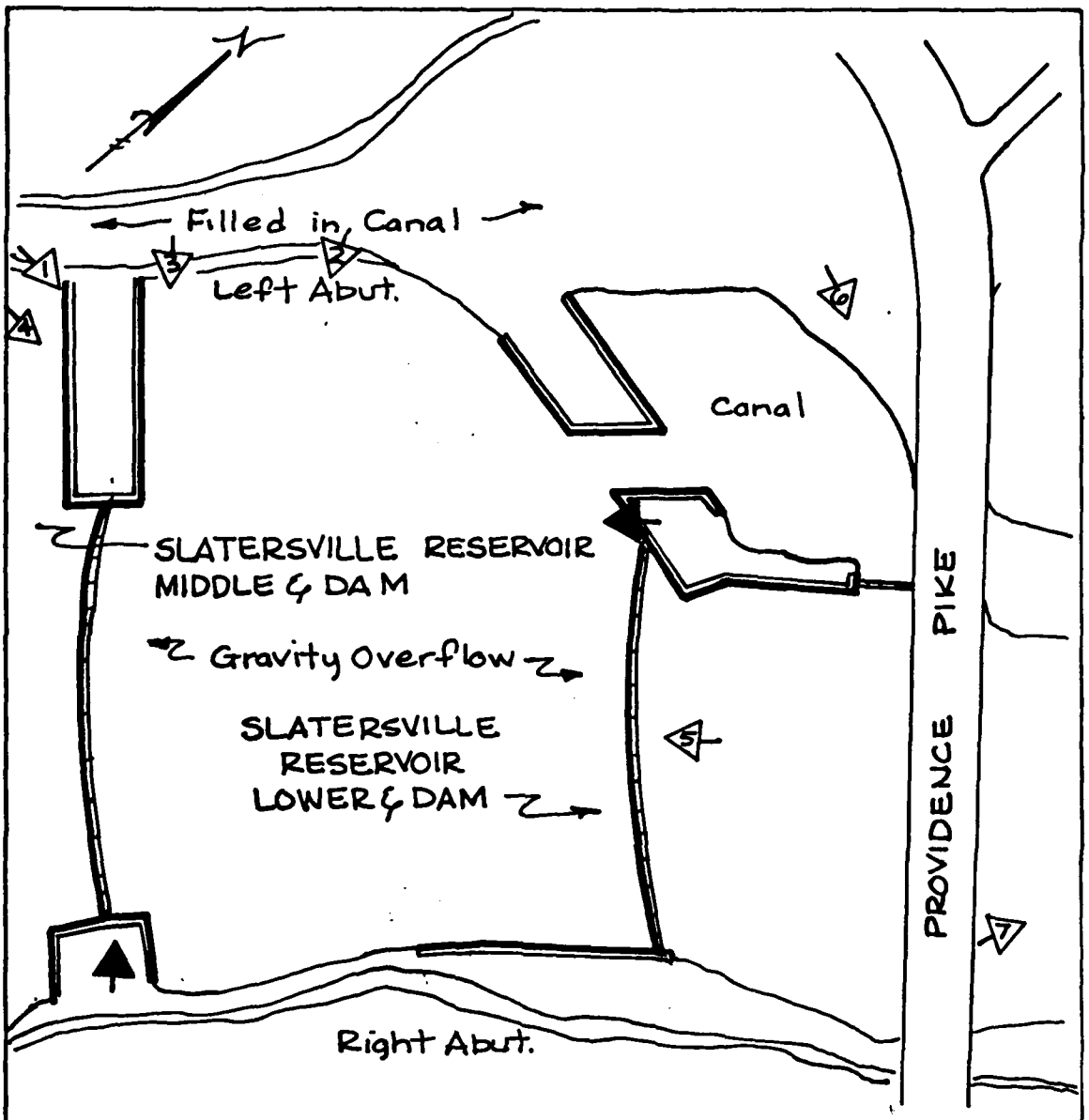

47
NO 49
SCALE 1" = 50'
PHOTO #4 (4/6/78)
PHOTO #1 (4/5/78)
2 GATES
A
B
G
TRENCH
NO 50 47A
TRENCH FILLED

1 5


△E
NO 46 48
DISTANCE
C TO D .8 MILE ±
△D
TRENCH
57
43-47C
44 45 47
48 49 50
50A
SLATERSVILLE
PLAN NO
B-44-45-47
48-49-50-50A

APPENDIX C

PHOTOGRAPHS



Appendix "C" Photos

Overview Photos

LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT · ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SLATERSVILLE RESERVOIR MIDDLE

SKETCH PLAN SHOWING LOCATION & ORIENTATION OF PHOTOS

STATE - R.I.

			SCALE
			DATE

SLATERSVILLE RESERVOIR MIDDLE DAM

1. Upstream face of ashlar masonry.

2. View of spillway and downstream face of ashlar masonry.

3. Downstream face of ashlar masonry.

4. Upstream face of ashlar masonry and reservoir shoreline.

$$Q_{P2} = 19{,}000 \left(1 - \frac{0.278}{9.5}\right)$$

$Q_{P2} = 18{,}450$ CFS

STEP 3 a. SURCHARGE HT $Q_{P2} = 242.16$

$STOR_2 = 1280$

$$STOR_2 = \frac{1280 \text{ Ac-Ft}}{56514 \text{ Ac}} \times 12 \text{ IN/FT} = 0.272$$

b. AVE STOR = 0.275

$$\frac{0.275 \text{ IN} \times 56514 \text{ Ac}}{12} = 1295 \text{ Ac.Ft}$$

SURCHARGE HT = 242.20

$Q_{P3} = 18{,}700$ CFS

SPILLWAY INADEQUATE TO PASS ½ PMF

OVERTOPPING BY 242.20 − 237.85 = 4.35 FT

STEP 3

a. SURCHARGE HT (Q_{p2}) = 246.03

b. VOLUME OF SURCHARGE = 2090

$$STOR_2 = \frac{2090 \text{ ACRE.FT}}{56514 \text{ ACRES}} \times 12 \text{ INCHS} = 0.44 \text{ INCHS}$$

AVE STOR = 0.445 INCHS

$$\frac{0.445 \text{ IN} \times 56514 \text{ Ac}}{12 \text{ IN/FT}} = 2096 \text{ AC.FT}$$

ELEV @ 2096 AC.FT ∴ 246.05

@ 246.05 Q_{p2} = 37,200 CFS

SPILLWAY INADEQUATE TO PASS PMF

OVERTOPPING BY 246.05 − 237.85 = 8.2 FT

CHECK 1/2 PMF = 38,000 ÷ 2 = 19,000 CFS =

STEP 1 Q_{p1} = 19,000 CFS

STEP 2 a. SURCHARGE HEIGHT = 242.28

b. VOLUME OF SURCHARGE = 1310 AC.FT

$$STOR_1 = \frac{1310 \text{ Ac-FT}}{56514 \text{ Ac}} \times 12 \text{ IN/FT} = 0.278$$

c. $$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{9.5}\right)$$

BY RFB DATE 6/13/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 6 OF 7
CHKD. BY DATE INSPECTION OF DAMS PROJECT
SUBJECT SLATTERSVILLE MIDDLE DAM

RESERVOIR ROUTING

DRAINAGE AREA = 88.30 SQ.MI = 56514 ACRES
SIZE CLASSIFICATION = SMALL
HAZARD CLASSIFICATION = HIGH
INSPECTION FLOOD 1/2 PMF TO PMF

CALCULATE PMF USING "PRELIMINARY GUIDANCE FOR ESTIMATING MAXIMUM PROBABLE DISCHARGE IN PHASE I DAM SAFETY INVESTIGATIONS, MARCH, 1978".

USE FLAT & COASTAL CURVE

@ 88.30 SQ MI PMF IN CFS/MI^2 = 430

88.30 SQ MI X 430 CFS/MI^2 = 37,969 CFS

SAY PMF = 38,000 = PEAK INFLOW

STEP 1 Q_{P1} = 38000 CFS

STEP 2 a. SURCHARGE HEIGHT = 246.20

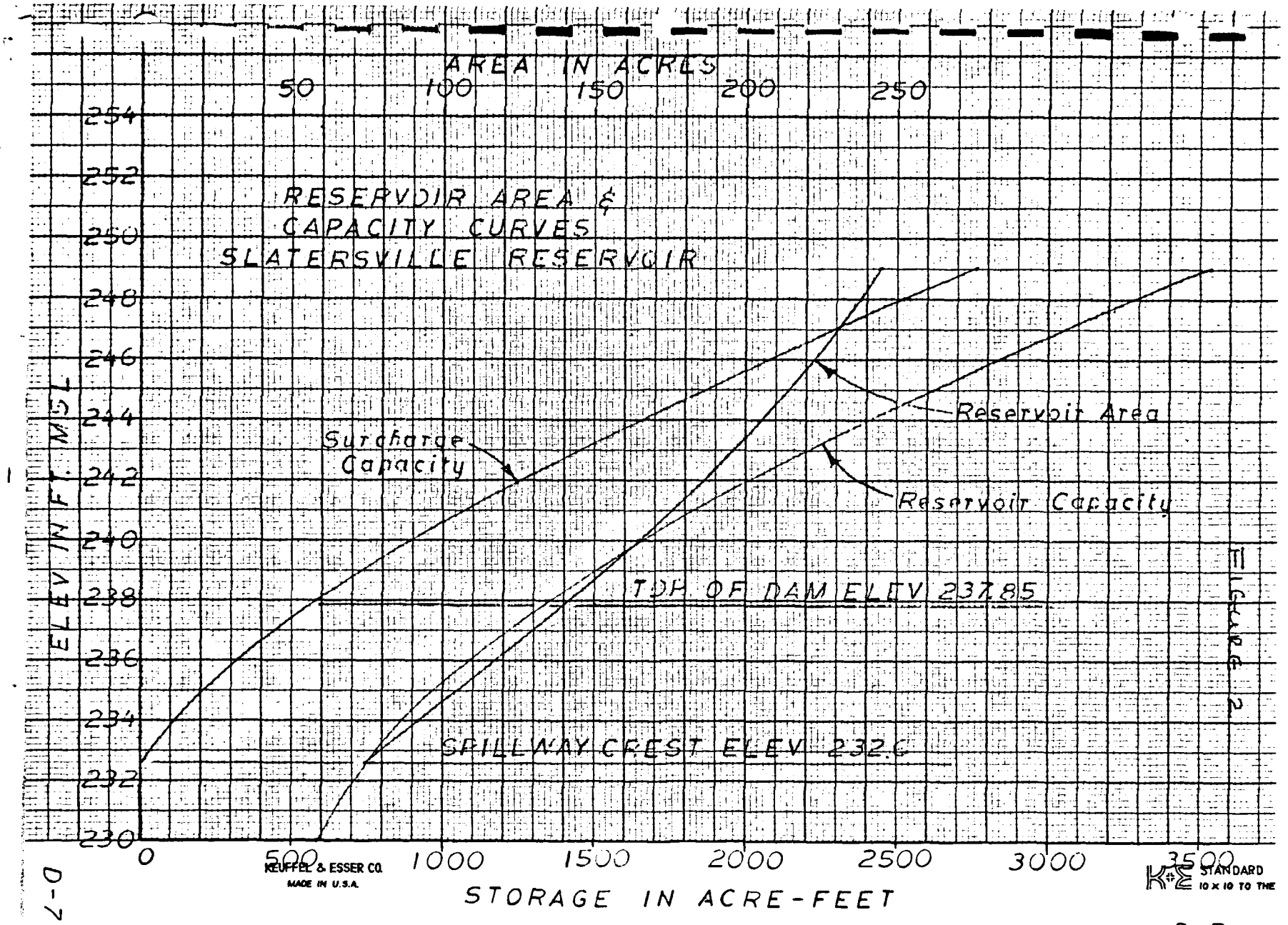
b. VOLUME OF SURCHARGE = 2120 ACRE.FT

$$STOR_1 = \frac{2120 \text{ ACRE.FT}}{5654 \text{ ACRE}} \times 12 \text{ IN/FT} = 0.45 \text{ INCHES}$$

c. $$Q_{P2} = Q_{P1} \times \left(1 - \frac{STOR_1}{19}\right)$$

$$= 38{,}060 \left(1 - \frac{0.45}{19}\right) = 38{,}000 (1 - .024)$$

Q_{P2} = 37,088


AREA IN ACRES
50
100
150
200
250
RESERVOIR AREA &
CAPACITY CURVES
SLATERSVILLE RESERVOIR
Surcharge
Capacity
Reservoir Area
Reservoir Capacity
TOP OF DAM ELEV 237.85
SPILLWAY CREST ELEV 232.6
ELEV IN FT. MSL
254
252
250
248
246
244
242
240
238
236
234
232
230
0
500
1000
1500
2000
2500
3000
3500
STORAGE IN ACRE-FEET
KEUFFEL & ESSER CO.
MADE IN U.S.A.
STANDARD
10 x 10 TO THE
FIGURE 2
D-7

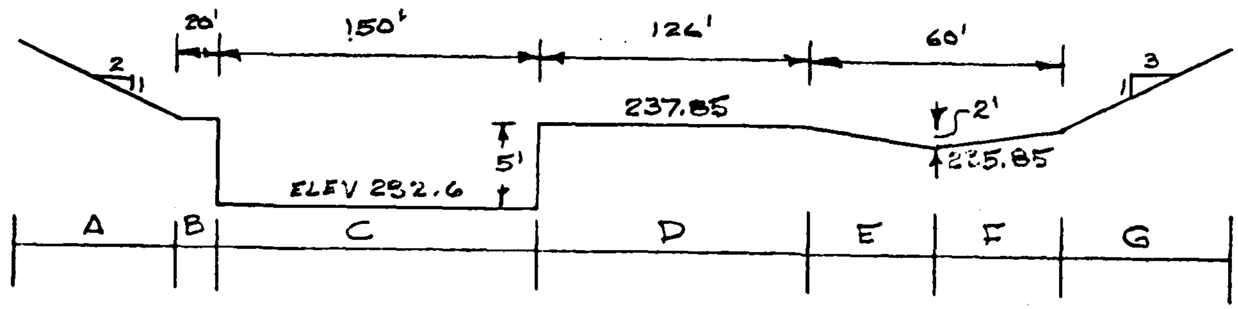
BY RFB DATE 6/13/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 5 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

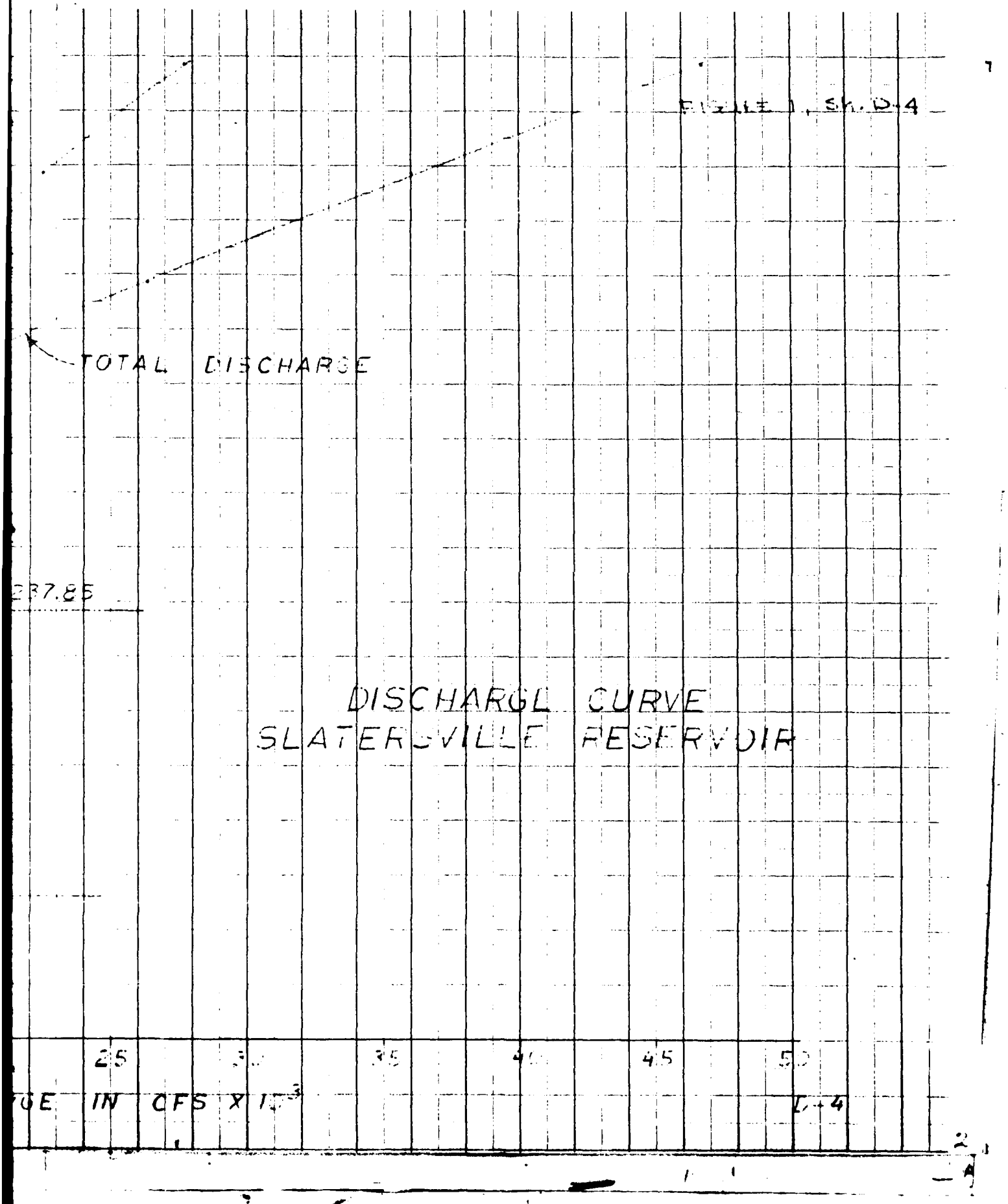
SUBJECT SLATERSVILLE MIDDLE DAM

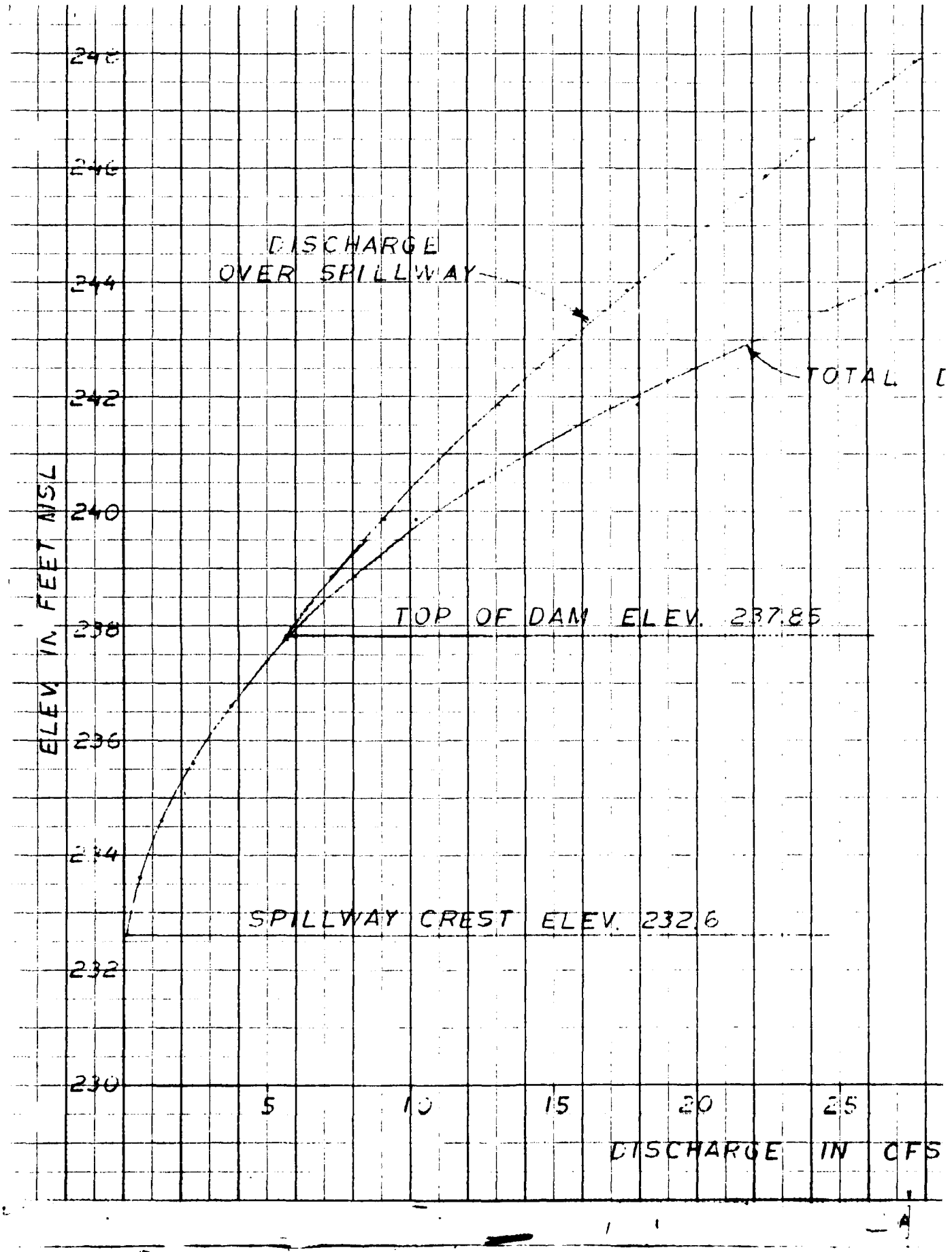
ELEV FT	E L	E H	C=2.5 Q	F L	F H	C=2.15 Q	G L	G H	C=2.5 Q	ΣQ	ELEV FT
233.6	0	0	0			0	0	0	0	465	
234.6	0	0	0			0	0	0	0	1315	
235.6	0	0	0			0	0	0	0	2416	
236.6	113	.38	7			7	0	0	0	3727	
237.85	30	1	75			75	0	0	0	5669	
238.85		2	212			212	3	.5	3	8079	
239.85		3	360			360	6	1	15	10188	
241.85		5	838			838	9	2	64	17955	
243.85		7	1389			1389	12	3	234	26271	
245.85		9	2025			2025	24	4	480	35955	
247.85		11	2736			2736	30	5	839	46760	
248.85		12	3118			3118	33	5.5	1064	52550	

BY RES DATE 6/13/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 4 OF
CHKD. BY DATE INSPECTION OF DAMS PROJECT
SUBJECT SLATERSVILLE MIDDLE DAM



ELEV	A, C=2.8			B, C=2.8			C, C=3.1			D, C=2.6		
FT	L	H	Q	L	H	Q	L	H	Q	L	H	Q
233.6	0	0	0	0	0	0	150	1	465	0	0	0
234.6	0	0						2	1315			
235.6	0	0						3	2416			
236.6	0	0						4	3720			
237.85	0	0	0	0	0	0		5.25	5594	0	0	0
238.85	2	.5	2	20	1	56		6.25	7266	126	1	328
239.85	4	1	11		2	158		7.25	9077		2	927
241.85	8	2	64		4	448		9.25	13032		4	2621
243.85	12	3	175		6	823		11.25	17546		6	4815
245.85	16	4	358		8	1267		13.25	22427		8	7413
247.85	20	5	626		10	1771		15.25	27692		10	10360
248.85	22	5.5	795	20	11	2043		16.25	30460		11	11952


TOTAL DISCHARGE
237.85
DISCHARGE CURVE
SLATERSVILLE RESERVOIR
25
35
45
50
GE IN CFS X 10³
D-4


DISCHARGE
OVER SPILLWAY
TOTAL
TOP OF DAM ELEV. 237.85
SPILLWAY CREST ELEV. 232.6
ELEV IN FEET MSL
240
238
236
232
230
5
15
20
25
DISCHARGE IN CFS

BY REB DATE 6/12/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 3 OF 7

CHKD. BY ____ DATE ____ INSPECTION OF DAMS PROJECT ____

SUBJECT SLATEKEVILLE MIDDLE DAM

ELEV MSL	AREA AC	AVE AREA	HT FT	INC STOR AC-FT	CUM STOR AC FT	SURCHARGE STOR AC FT
212	0					
214	7.2	3.6	2	7.2	7.2	
216	14.4	10.8		21.6	28.8	
218	21.7	18.0		36.0	64.8	
220	28.9	25.3		50.6	115.4	
222	36.1	32.5		65.0	180.4	
224	43.3	39.7		79.4	259.8	
226	50.6	47.0		94.0	353.0	
228	57.8	54.2		108.5	461.5	
230	65.0	61.4		122.8	584.3	
232	72.2	68.6	2	137.2	721.5	
233.6	74.4	73.3	0.6	44.0	765.5	0
234	92.0	83.2	1.4	116.5	882.0	116
236	117.0	104.5	2	209.0	1091.0	325
238	141.5	129.2		258.4	1349.4	584
240	164.2	153.0		306.0	1655.4	890
242	186.0	175.2		350.4	2005.8	1240
244	205.5	195.8		391.6	2397.4	1632
246	222.5	214.0		428.0	2825.4	2060
248	238.0	230.2	2	460.4	3285.8	2520
249	244.7	241.4	1	241.4	3527.2	2761

BY RFB DATE 6/12/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 2 OF
CHKD. BY DATE INSPECTION OF DAMS PROJECT
SUBJECT SLATEVILLE MIDDLE DAM

RESERVOIR AREA COMPUTATIONS

NORMAL RESERVOIR SURFACE ELEV 230

READING	#2	35.03	#3	35.82	
"	#1	34.20	#2	35.03	AVE = 0.81
		0.83		0.79	

AREA = 0.81 × 91.83 = 74.38 ACRES

AREA @ ELEV 240

READING	#2	37.28	#3	39.07	
"	#1	35.49	#2	37.28	AVE = 1.79
		1.79		1.79	

AREA = 1.79 × 91.83 = 164.38 ACRES

AREA @ ELEV 249

READING	#2	44.30	#3	46.97	
READING	#1	41.64	#2	44.30	AVE = 2.665
		2.66		2.67	

AREA = 2.665 (91.83) = 244.73 ACRES

BY JKH DATE 4/3/79 LOUIS BERGER & ASSOCIATES INC. SHEET NO. 1 OF 1
CHKD. BY DATE INSPECTION OF DAMS - CONN. & RI PROJECT
SUBJECT SLATTERSVILLE RESERVOIR - DRAINAGE AREA

FIND: ENTIRE AREA ABOVE RESERVOIR LOWER DAM No. 47

PLANIMETER NO. 3651-30
INDEX @ 89.9
1.0 = 1 sq in

USGS Sheet	Ave. Reading (sq in)
Clayville, RI.	12.69
Chepachet, RI	382.49 sq mi/sh − (0.50 + 10.27 + 29.47) = 347.25
Georgiaville, R.I.	(10.4 x 5.9) + 22.24 + 14.25 − 2.32 = 95.53
Thompson, Conn, R.I	5.59 + 0.86 + 16.30 + 14.65 = 37.40
Oxford, Mass, Conn, RI	21.83
Uxbridge, Mass, RI.	(13 x 5.3) + 7.31 + 21.30 + 0.72 = 98.23
Blackstone, Mass, RI.	3.47 + 0.14 = 3.61
	TOTAL = 616.54 sq in

Scale: $(1")^2 = (2{,}000')^2$ 4,000,000 sq ft/sq in

$$\text{Area} = \frac{616.54 \text{ sq in} \times 4{,}000{,}000 \text{ sq ft/sq in}}{43{,}560 \text{ sq ft/acre}} = \boxed{56{,}615.24 \text{ Acres}}$$

$$56{,}615.24 \div 640 \text{ Acres/sq mi} = \boxed{88.46 \text{ sq mi}}$$

ADJUST AREA FOR DIFFERENCE BETWEEN DAM 46 & 47

READING #2 77.63 #3 78.73 #4 79.83 ΔA = 1.1 SQ IN
" #1 75.93 #2 77.63 #3 78.73 A = 615.44
1.7 1.1 1.1

$$\text{AREA} = \frac{615.44 \times 4{,}000{,}000}{43{,}560} = 56514 \text{ ACRES} = 88.30 \text{ SQ MI}$$

D-1

APPENDIX D

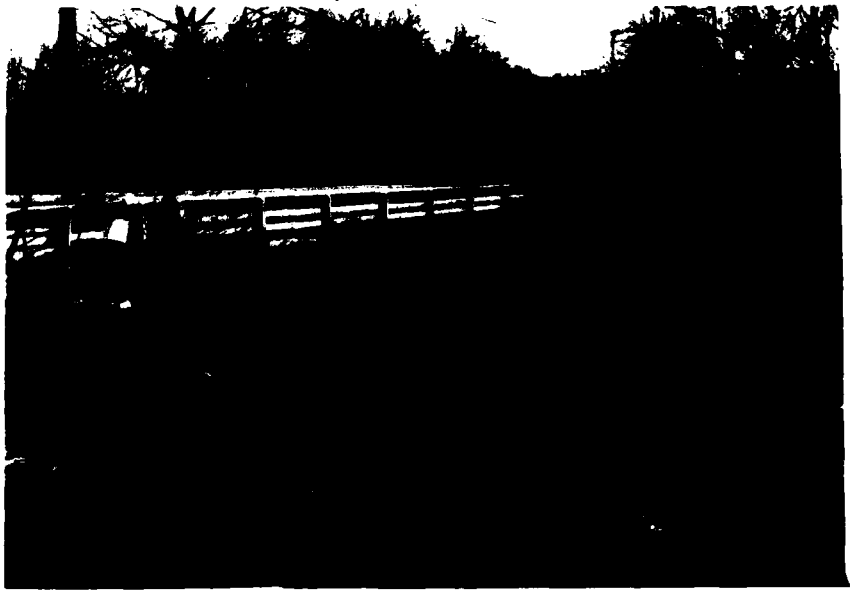
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

SLATERSVILLE RESERVOIR MIDDLE DAM

7. Downstream channel beyond Providence Pike Bridge.

SLATERSVILLE RESERVOIR MIDDLE DAM

5. View of Middle Dam and Lower Reservoir and Dam.



6. Downstream twin arch masonry bridge (Providence Pike).

BY RFB DATE 6/12/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 9 OF.

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT SLATERSVILLE MIDDLE DAM FAILURE ANALYSIS

STEP 1: RESERVOIR STORAGE AT FAILURE

ASSUME WATER ELEV AT TOP OF DAM 237.85

FROM CAPACITY CURVE S = 1330 AC-FT

$H = 237.85 - 212.0 \approx 26$ FT

W = 40% OF 150 = 60 FT

STEP 2 PEAK FAILURE OUTFLOW

$$Q_{P1} = 8/27\, W\sqrt{g}\, Y_o^{3/2}$$

$$Q_{P1} = 1.68(60)(26)^{3/2}$$

$$Q_{P1} = 13{,}363 \text{ CFS}$$

ADD SPILLWAY FLOW:

$$Q_{SPILLWAY} = \frac{90}{150}(5594) + 156 = 3506$$

$$Q_{P1\,TOTAL} = 13{,}363 + 3506 = 16{,}869$$

SAY $Q_{P1} = 16{,}870$ CFS

SECTION BELOW PROVIDENCE PIKE

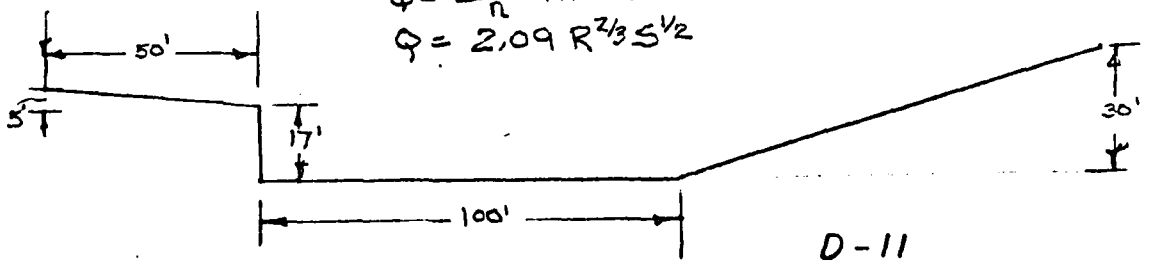
$n = 0.045$

$S = \frac{212-180}{8000} = .004$

$S^{1/2} = .0632$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$Q = 2.09\, R^{2/3} S^{1/2}$

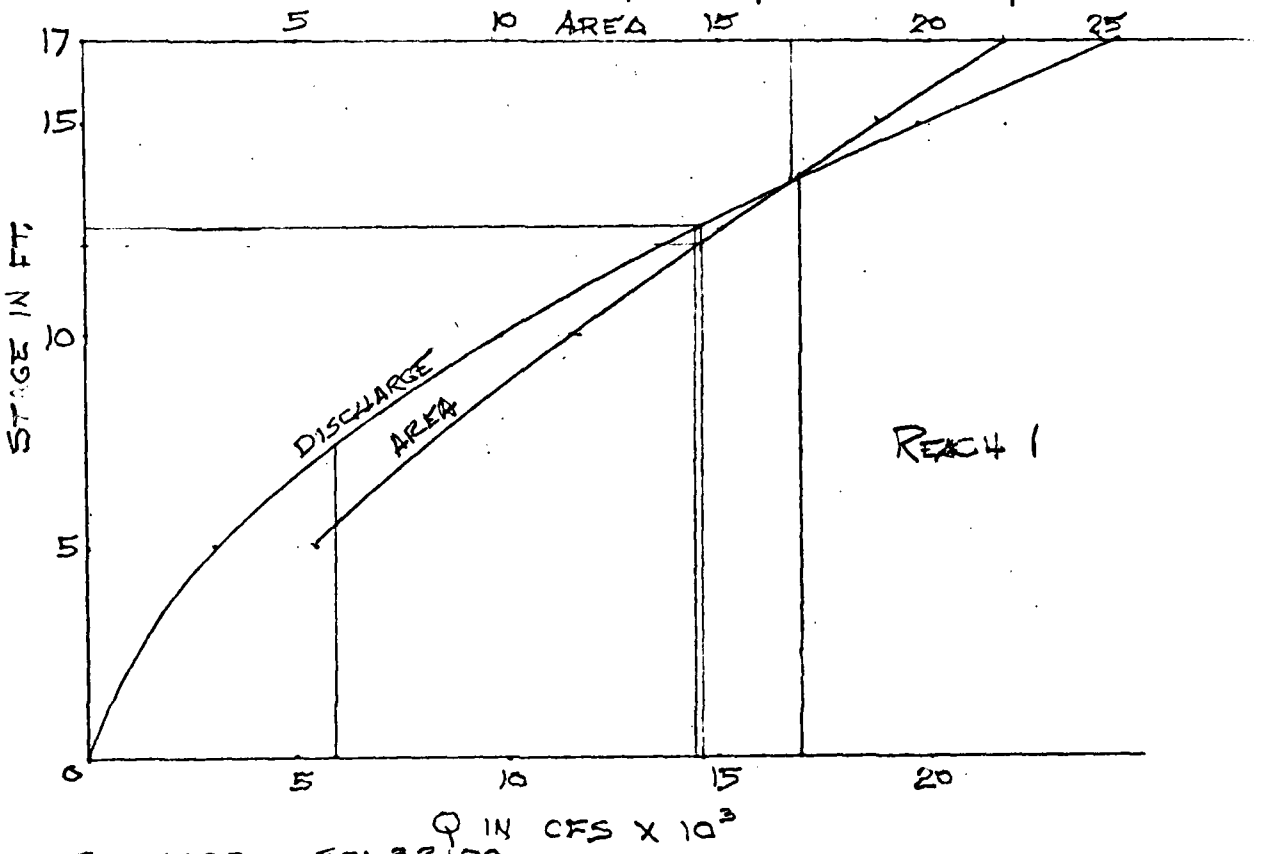


BY REB DATE 6/14/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 10 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT SLATTERY - LE MIDDLE DAM FAILURE ANALYSIS

DEPTH	ΔAREA	ΣAREA	WP	R	$R^{2/3}$	Q
5	542	542	122.4	4.43	2.70	3058
10	625	1167	144.8	8.06	4.02	9805
15	709	1876	167.2	11.22	5.02	19652
17	306	2182	176.2	12.38	5.36	24444
20	520	2712	216.7	12.51	5.39	30550



STA 0+00 TO STA 82+00

ESTIMATE REACH OUTFLOW FOR REACH #1 TO POND JUST ABOVE GAGING STATION.

$O_{P_1} = Q_{INFLOW} = 16,870$

REACH LENGTH = 2300 FT.

STAGE = 13.8, AREA ≅ 1670 ; 96 ACRE·FT

ADD VOLUME BETWEEN DAM & PROVIDENCE PIKE

$$\Delta V = \frac{(1000)(13.8)(350)}{43{,}560} = 95.04$$

$V_1 = 96 + 95 = 191$ ACRE·FT

$$Q_{P2\,(TRIAL)} = 16{,}870\left(1 - \frac{191}{1330}\right) = 16{,}870(1 - .144)$$

$Q_{P2\,(TRIAL)} = 14{,}440$ CFS

STAGE = 12.5, AREA ≅ 1500 ; 79.2

ADD VOLUME BETWEEN DAM & PROVIDENCE PIKE

$$\Delta V = \frac{1000 \times 12.5 \times 300}{43{,}560} = 86$$

$V_2 = 79 + 86 = 165$ ACRE-FT

$$V_{AVE} = \frac{191 + 165}{2} = 178 \text{ ACRE·FT}$$

$$Q_{P2} = 16870\left(1 - \frac{178}{1330}\right) = 16{,}870(1 - .134)$$

$Q_{P2} = 14610$, STAGE = 12.6 FT

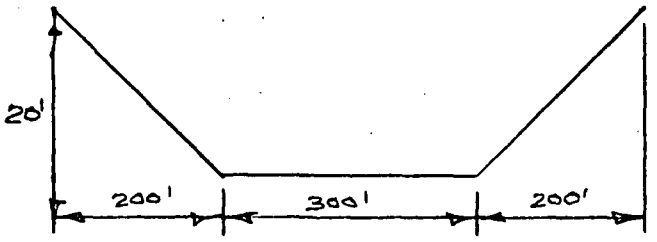
BY RFB DATE 6/14/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 12 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT SLATERSVILLE MIDDLE DAM FAILURE ANALYSIS

STA 32+00 TO STA 60+00

REACH 2, L = 2600 FT

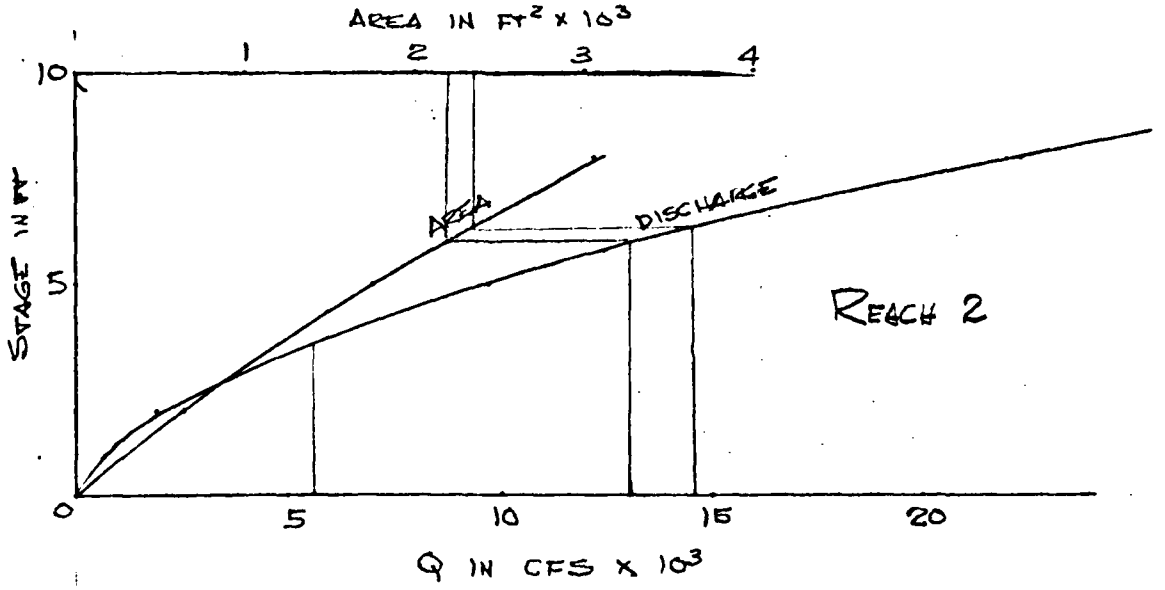


$S^{1/2} = 0.0632$

$n = 0.045$

$Q = 2.09 AR^{2/3}$

DEPTH	ΔAREA	ΣAREA	P	R	$R^{2/3}$	Q
2	620	620	340.2	1.82	1.49	1930
5	1130	1750	400.4	4.37	2.67	9765
8	1290	3040	460.8	6.60	3.52	22365
10	960	4000	501	11.98	5.24	43804



OPI INFLOW = 14,610

STAGE = 6.3 FT ∴ AREA = 2360

V_1 = 141 AC-FT

Q_{p2} (TRIAL) $= 14,610\left(1-\frac{141}{1330}\right) = 14,610(1-.106)$

$Q_{p2T} = 13060$

STAGE = 6 FT ∴ AREA = 2190 $Y_2 = 131$

$V_{AVE} = \frac{141+131}{2} = 136$ ACRE-FT

$Q_{p3} = 14,610\left(1-\frac{136}{1330}\right) = 14,610\,(1-.102)$

$Q_{p3} = 13,120$ CFS

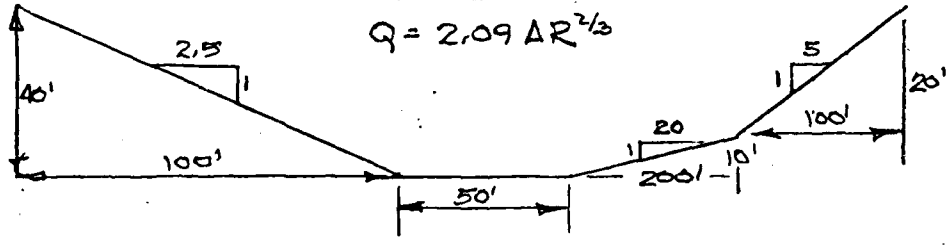
STA 60+00 TO STA 76+00 REACH 3

L = 1606 FT

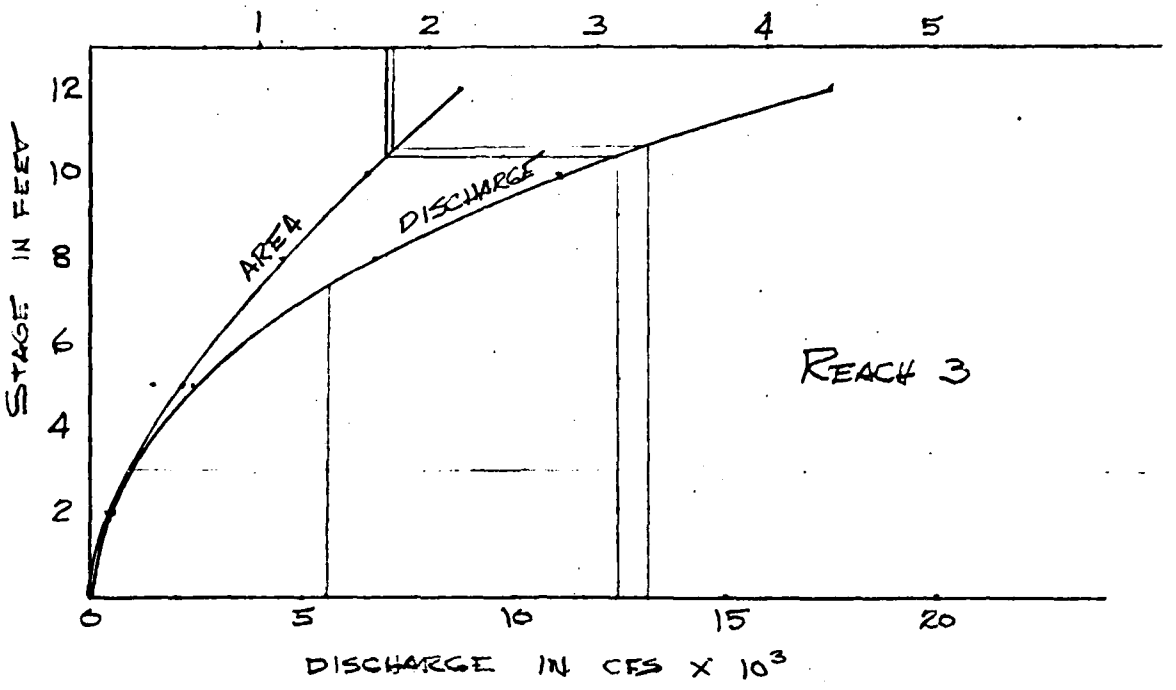
$n = 0.045$

$S^{1/2} = 0.0632$

$Q = 2.09\,AR^{2/3}$



DEPTH	ΔAREA	ΣAREA	WP	R	$R^{2/3}$	Q
2	145	145	95.4	1.52	1.32	400
5	386	531	163.7	3.24	2.19	2430
8	589	1120	231.7	4.83	2.86	6694
10	505	1625	277.1	5.86	3.25	11038
12	565	2190	292.7	7.48	3.83	17530



Q_{P3} 13,120 STAGE = 10.6 AREA = 1790

$$V_1 = \frac{(1790)(1666)}{43{,}560} = 65.7 \text{ ACRE-FT}$$

$$Q_{P4(TRIAL)} = 13{,}120\left(1 - \frac{66}{1330}\right) = 13{,}120\,(1 - .05)$$

$$Q_{P4(TRIAL)} = 12{,}460$$

STAGE = 10.4 FT AREA = 1750 $V_2 = 64.3$

$V_{AVE} = 65$ ACRE-FT

$$Q_4 = 13{,}120\left(1 - \frac{65}{1330}\right) = 13{,}120\,(1 - .049)$$

$Q_4 = 12{,}477$ CFS

STAGE = 10.5

BY REB DATE 6/15/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 15 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

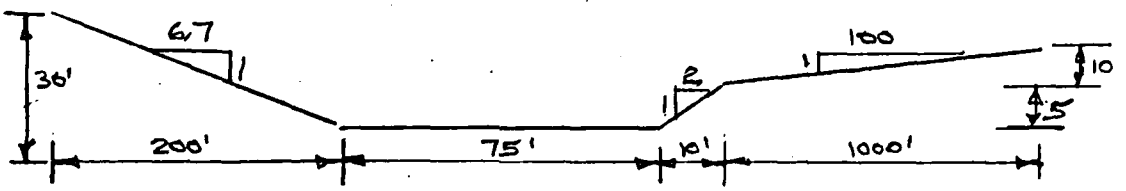
SUBJECT SLATERSVILLE MIDDLE DAM, FAILURE ANALYSIS

STA 76+00 TO STA 106+00

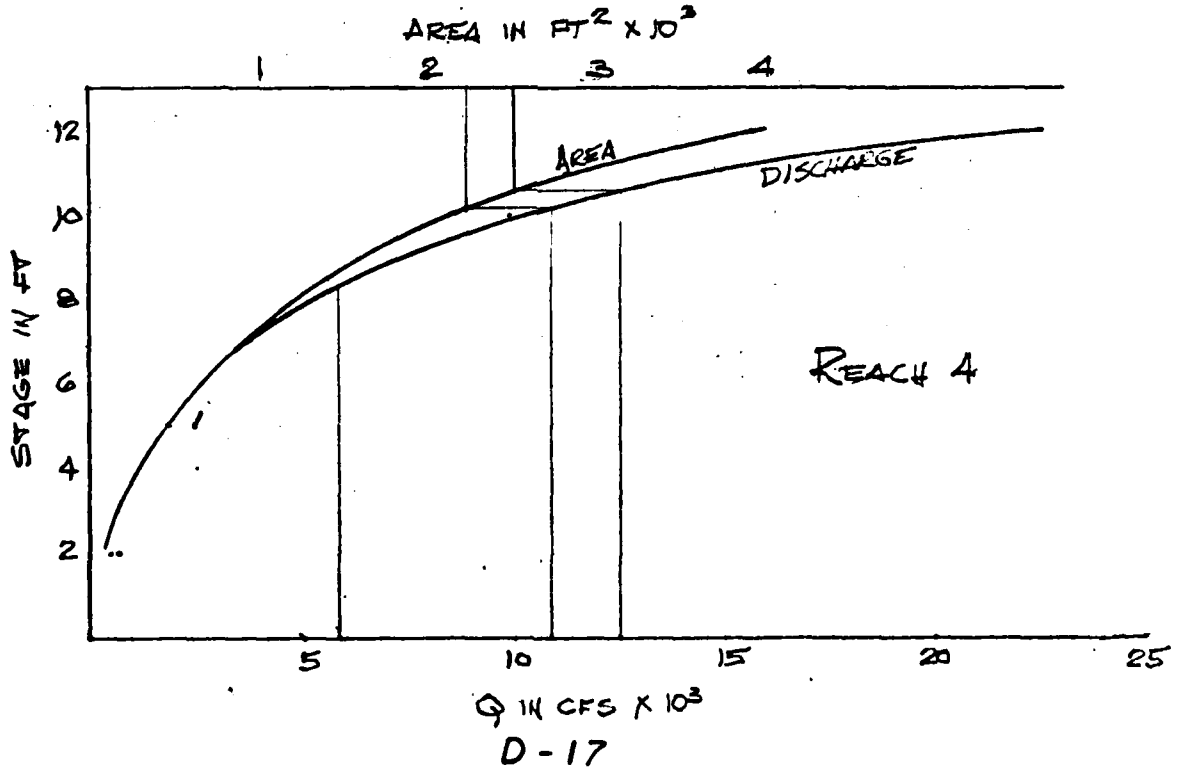
$n = 0.045$

$S^{1/2} = .0632$

$Q = 2.09 R^{2/3} A$



DEPTH	Δ AREA	Σ AREA	W.P.	R	$R^{2/3}$	Q
2	161	161	93	1.73	1.44	484
5	323	484	120	4.03	2.53	2560
7	425	909	334	2.72	1.95	3704
10	1233	2142	654	3.27	2.21	9893
12	1785	3927	867	4.53	2.74	22488



REACH 4

D-17

$Q_{P4} = 12,477$ CFS STAGE = 10.6 FT

AREA = 2500 $V_1 = \frac{2500 \times 3000}{43,560} = 172$ ACRE-FT

Q_{F5} (TRIAL) $= 12,477\left(1 - \frac{172}{1330}\right) = 12,477\,(1 - .129)$

Q_{P5} (TRIAL) $= 10,870$

STAGE = 10.2, A = 2220 $V_2 = 153$ ACRE-FT

$Q_5 = 12477\left(1 - \frac{\frac{153+172}{2}}{1330}\right) = 12477\,(1 - .122)$

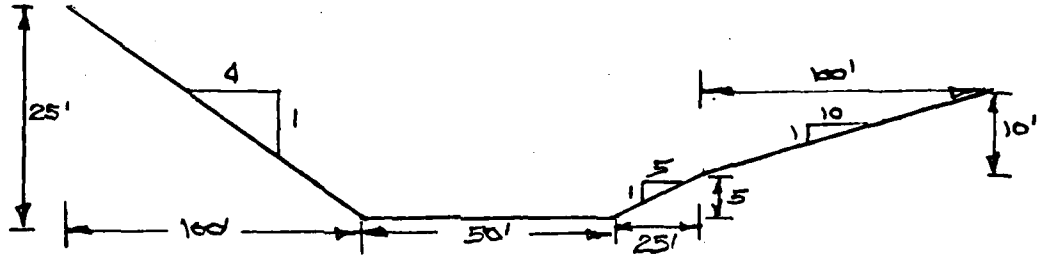
$Q_5 = 10,955$ STAGE = 10.3

STA 106+00 TO STA 146+00

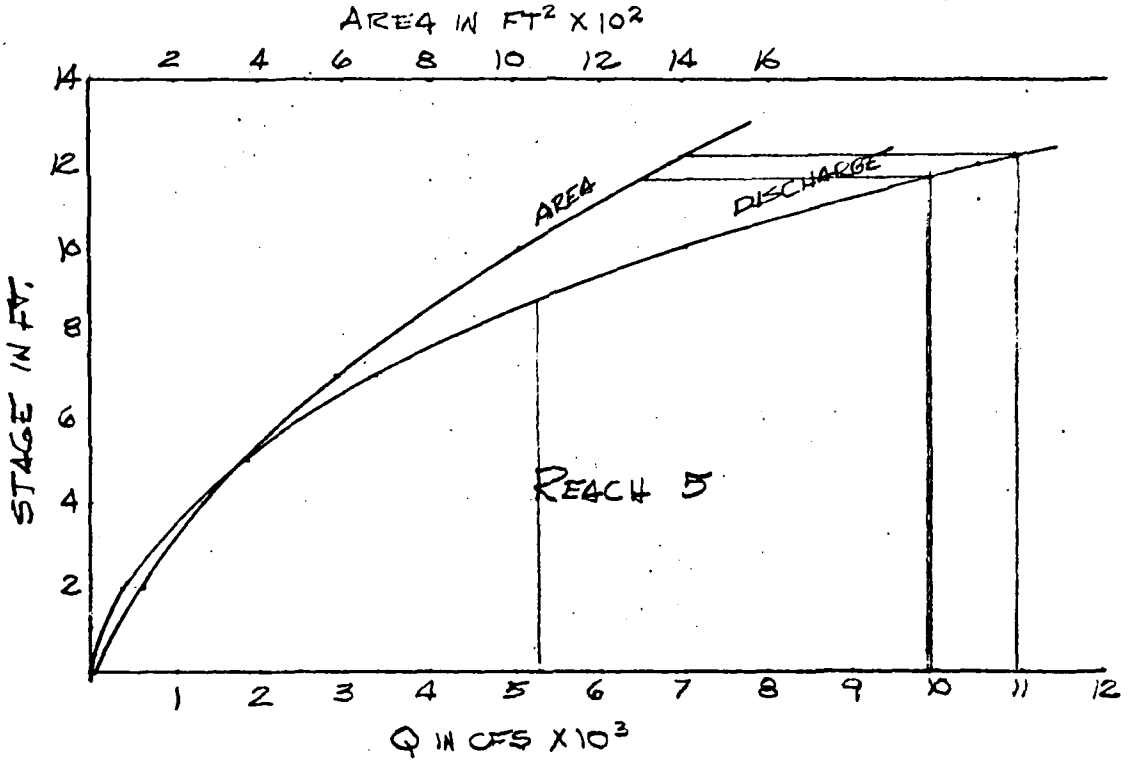
$n = 0.045$

$S^{1/2} = 0.0632$

$Q = 2.09\,R^{2/3}A$



DEPTH	ΔAREA	AREA	W.P.	R	$R^{2/3}$	Q
2	118	118	68.4	1.73	1.41	355
5	244	362	96.1	3.77	2.42	1830
7	218	580	124.4	4.66	2.79	3382
10	432	1012	167.0	6.06	3.33	7043
12	358	1370	195.3	7.01	3.67	10508



$Q_5 = 10{,}955$ STAGE = 12.2 AREA = 1400

$V_1 = \frac{1400 \times 4000}{43{,}560} = 128.6$ ACRE-FT

$Q_6(\text{TRIAL}) = 10{,}955\left(1 - \frac{128.6}{1330}\right) = 10{,}955(1 - .097)$

$Q_6(\text{TRIAL}) = 9892$ CFS STAGE = 11.6 AREA = 1300

$V_2 = \frac{1300 \times 4000}{43{,}560} = 119.4$ $V_{AVE} = 124$ ACRE-FT

$Q_6 = 10{,}955\left(1 - \frac{124}{1330}\right) = 10{,}955(1 - .093)$

$Q_6 = 9936$ CFS

STAGE = 11.7 FT

BY REZ DATE 6/22/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 18 OF

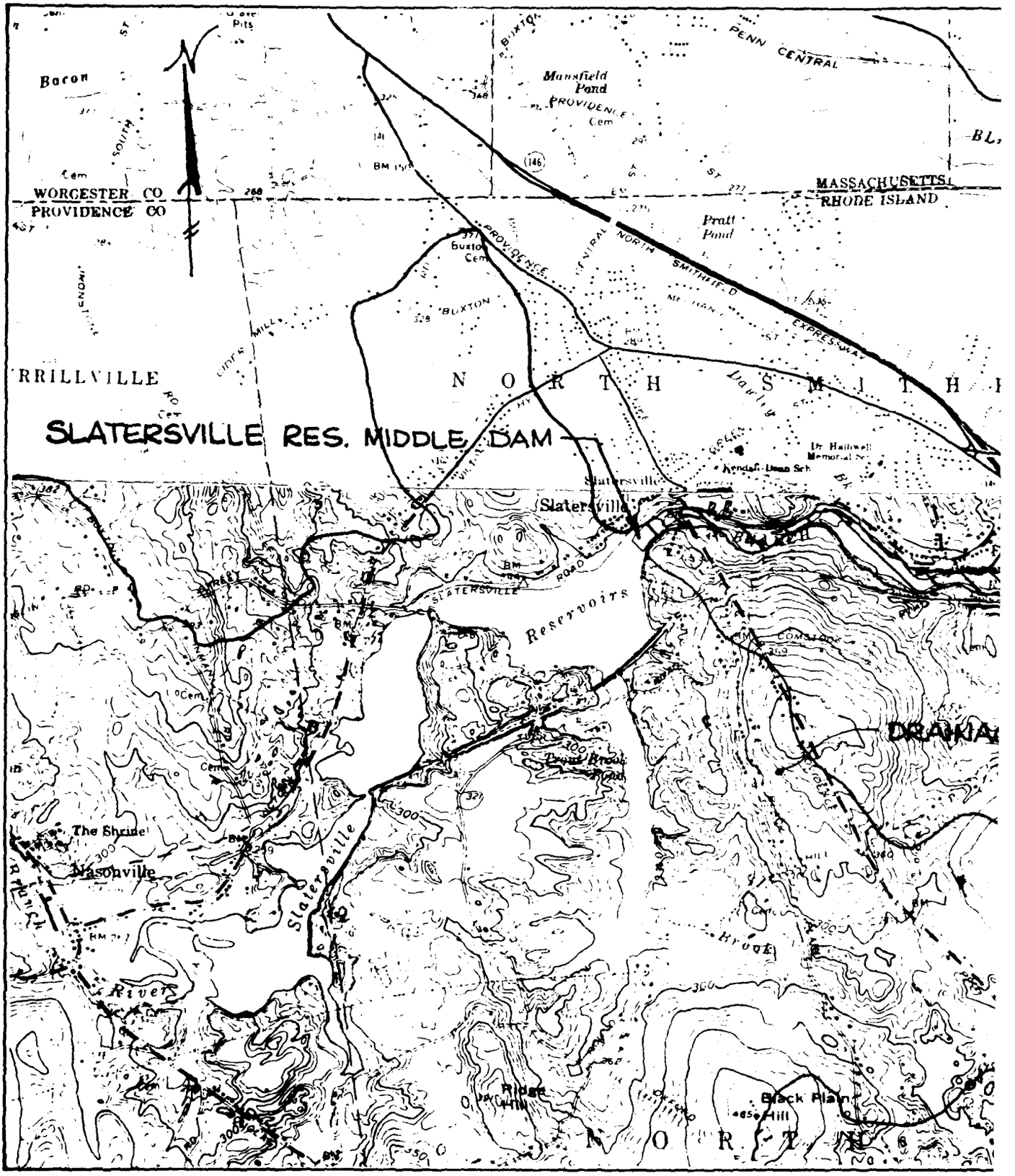
CHKD. BY DATE PROJECT

SUBJECT SLATERSVILLE MIDDLE DAM — FAILURE ANALYSIS

SUMMARY OF STAGES

$Q_{SPILLWAY} = 5594$ CFS

RIVER STA TO	RIVER STA	FAILURE STAGE	SPILLWAY STAGE	Δ STAGE
0+00	32+00	12.6	7.4	5.2
32+00	60+00	6.1	3.6	2.5
60+00	76+00	10.5	7.4	3.1
76+00	106+00	10.3	8.3	3.0
106+00	146+00	11.7	8.8	2.9


SLATERSVILLE RES. MIDDLE DAM
Bacon
Mansfield Pond
PROVIDENCE Cem
PENN CENTRAL
WORCESTER CO
PROVIDENCE CO
MASSACHUSETTS
RHODE ISLAND
Pratt Pond
BUXTON
PROVIDENCE & WORCESTER
NORTH SMITHFIELD
EXPRESSWAY
RRILLVILLE
N O R T H S M I T H
Slatersville
Reservoirs
Trout Brook
The Shrine
Nasonville
Slatersville
River
Ridge
Black Plain Hill
N O R T

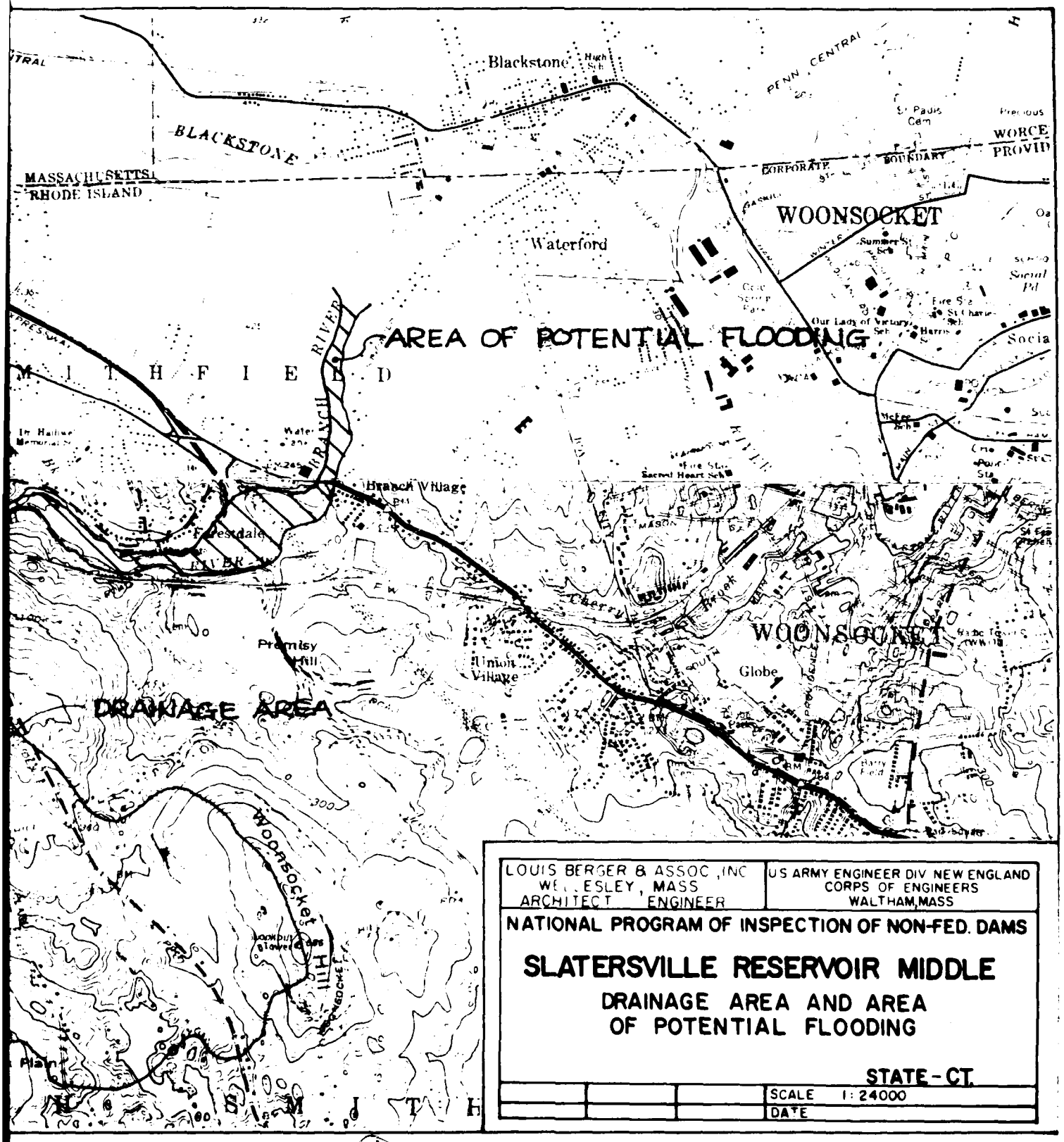


FIGURE 3 - SHEET D-21

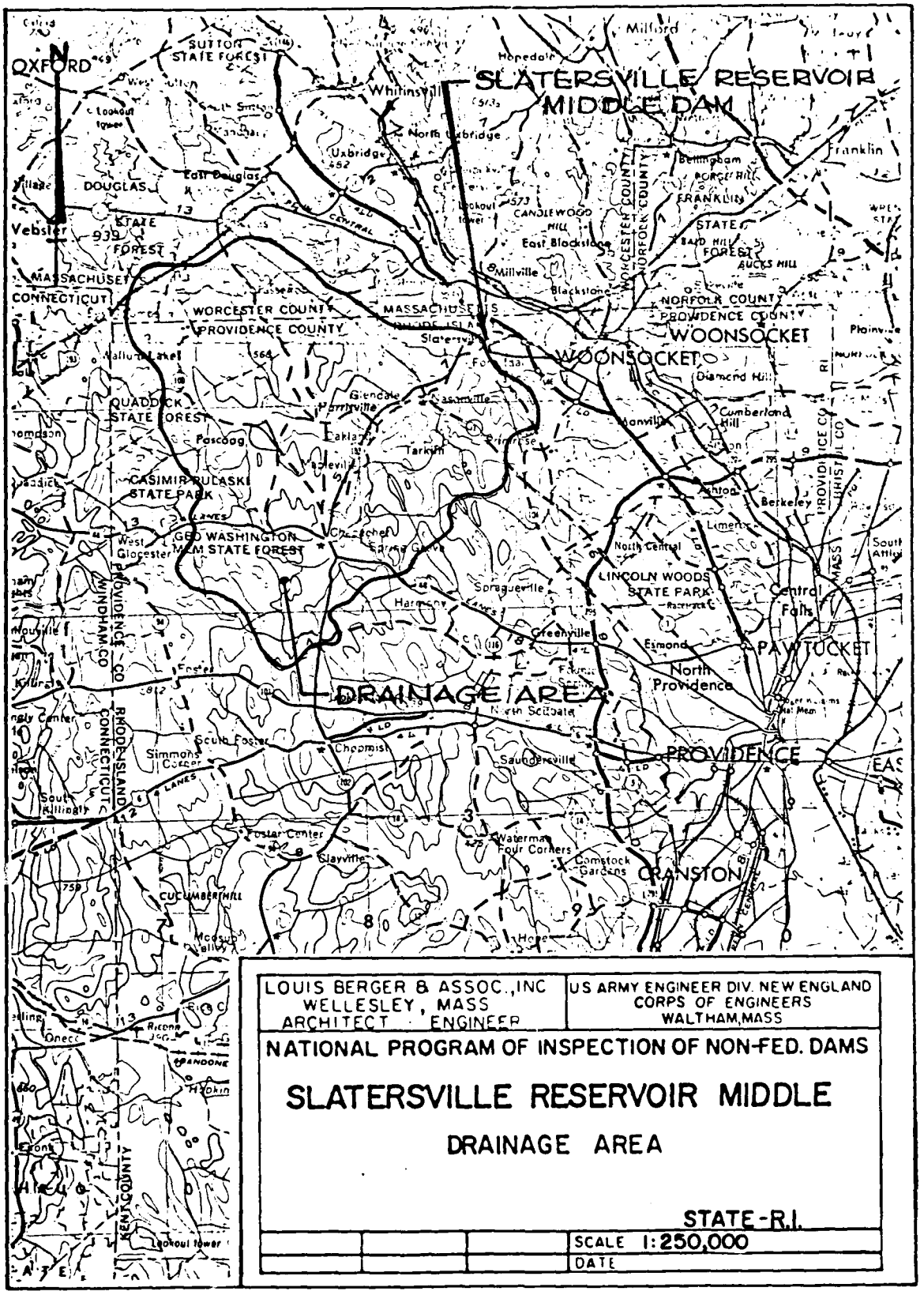


FIGURE 4 - SHEET D-22

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS